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HELMINTHOLOGICAL ABSTRACTS

A quarterly review of world literature on helminths and their vectors especially in relation to veterinary, medical and plant pathology, soil science, fisheries, fresh-water and marine zoology, taxonomy and geographical distribution.

Prepared by the

COMMONWEALTH BUREAU OF HELMINTHOLOGY

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From Volume 29, which was issued during 1960, each volume of *Helminthological Abstracts* will consist of four quarterly parts appearing in March, June, September and December. Each part includes abstracts of all papers which come to hand during the relevant period of preparation, regardless of their date of publication and, in Volume 29 is provided with author indexes only; from Volume 30 a subject index will be included in each part. A title page and author and subject indexes for each volume will also be issued.

The earlier arrangement by which abstracts of the literature published in each year were brought into a single volume when bound terminates with the completion of Volume 27 (1958).

Volume 28 Part 1 contained abstracts of such literature published in 1959 as came to hand before September of that year. The remaining parts are being compiled from 1959 references and the supplementary titles of helminthological books and articles which came to the attention of the Bureau too late for inclusion in the relevant annual volume under the old scheme.

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HELMINTHOLOGICAL ABSTRACTS

Vol. 30, Part 2

ABSTRACTS

When an address accompanies an abstract, it is that of the first author.

MEDICAL HELMINTHOLOGY

Trematoda

544—AINSLIE, J. F., 1959. "Schistosomiasis amongst Rhodesian troops." **Journal of the Royal Army Medical Corps, 105** (3), 131–134.

On urine examination 60 men from a Rhodesian battalion were positive for *Schistosoma haematobium*; all had been treated with nilodin. Several months later when in Malaya 30 were still positive and 31 further cases were detected; 30 were not detected until 20 months after leaving Africa. All were *S. haematobium* infections and in 11 cystoscopy was needed for diagnosis. Exercise tended to render undetected carriers manifestly positive. 30 were given intravenous sodium antimony tartrate with no recurrences, 31 received stibophen, nilodin or anthiomaline with 10 recurrences. In view of the risk of undetected carriers disseminating the infection it is recommended that there should be routine urine examination at regular intervals for all in the armed forces. W. K. Dunscombe

545—BRINK, C. J. H., BOTHA, H. P., COMBRINK, H. J. & ERASMUS, F. J., 1959. [Chief Regional Health Officer, Pietersburg.] "Mass chemotherapy in Bilharzia in Northern Transvaal." **South African Medical Journal, 33** (26), 536–542. [Afrikaans summary p. 542.]

Previous surveys have shown that *Schistosoma* occurs in well over 50% of the Bantu children of school age in the sub-tropical part of the Northern Transvaal. In order to assess the feasibility of a control programme, as advocated by Price (1950) [A Textbook of the Practice of Medicine, 8th edition] and other authors, the proposed scheme was extensively tested for two years in specially selected localities. Investigations in the Letaba district revealed a high incidence of helminth infections in general, i.e. *Schistosoma haematobium* (49·7%), *S. mansoni* (57·8%), hookworm (14%), *Ascaris* sp. (10·5%), and *Taenia* sp. (0·98%). Schistosomiasis therefore may, in the future, be considered as only a sub-division of the wider problem of helminthiasis. The authors state that in all the infected schoolchildren no, or relatively few, abnormalities were discovered on clinical examination. They therefore question whether schistosomiasis should be regarded as a disease in the native or should be considered as a harmless host-parasite relationship. The oral drugs at present available, used in mass therapeutic treatments such as could be carried out safely during the period of a normal school week, were found to be unsuccessful. It is concluded that the most effective permanent anti-schistosomiasis measure is the improvement of environmental conditions. D. F. Mettrick

546—COLLOMB, H., DESCHIENS, R. & DEMARCHI, J., 1960. "Sur deux cas de distomatose cérébrale à *Heterophyes heterophyes*." **Bulletin de la Société de Pathologie Exotique, 53** (2), 144–147. [Discussion p. 147.]

*547—DUDKOWSKI, L. & SIUDAK, A., 1957. "Trzy przypadki paragonimiasis płuc." [Three cases of lung paragonimiasis.] **Gruzlica. Warsaw, 25** (1), 57–62.

548—EL-GHAFFAR, Y. A. & EL-GHAFFAR, M. A., 1960. "Methyl androstenadiol in schistosomal cirrhosis of the liver." **Journal of Tropical Medicine and Hygiene, 63** (1), 15–17.

Eleven cases of schistosomal cirrhosis in Egypt, five of whom also has ascites, were treated by methylandrostenadiol as follows: (i) one 25 mg. tablet orally twice daily (eight cases);

* Titles so marked throughout this number have not been seen in the original.

(ii) one 50 mg. ampoule intramuscularly once daily (three cases). In all patients treatment was continued for one month. There was some improvement in the general condition but none in the ascites. In two advanced cases fatal haematemesis and melaena occurred.
W. K. Dunscombe

*549—GEHER, F., 1957. "Über Paragonimiase. Beiträge zur Röntgendiagnostik und Einteilung der Lungenparagonimiase." **Fortschritte auf dem Gebiete der Röntgenstrahlen, 87** (3), 313–321.

550—HABIB, Y. A. & HABIB, S. A., 1959. [Department of Physiology, Faculty of Medicine, Alexandria University, U.A.R.] "Serum sodium and potassium concentrations in bilharziasis." **Journal of the Egyptian Medical Association, 42** (10), 567–573.
Changes in the serum sodium and potassium were studied in 40 male patients with *Schistosoma haematobium* and 45 with *S. mansoni*. 33 of the latter had enlarged liver and spleen with ascites, while in 13 both organs were enlarged without ascites. The serum potassium was normal in all, as was the serum sodium in the *S. haematobium* cases, but in the 33 *S. mansoni* infections with ascites the serum sodium was significantly lower than normal. In the ascitic fluid the concentrations of sodium and potassium were lower than in serum. The low serum sodium in the *S. mansoni* infections was not due to the infection *per se* but to hepatic fibrosis.
W. K. Dunscombe

551—HATANO, K., 1960. [Department of Oto-Rhino-Laryngology, School of Medicine, Kanazawa University, Kanazawa, Japan.] [Epidemiological studies on paragonimiasis in Minami-Uwa-Gun, Ehime-Ken, especially on mass examination for paragonimiasis.] **Japanese Journal of Parasitology, 9** (3), 294–308. [In Japanese: English summary p. 308.]
A mass examination of 3,116 children from primary and secondary schools for paragonimiasis was carried out in the basin of the River Sozu in Ehime Prefecture. 72·8% of the cases positive to an intradermal test were positive to a complement fixation test, and 68·5% of those positive to complement fixation tests were positive for eggs. 10·7% of those negative to complement fixation tests were positive for eggs. The results of intradermal tests on 47 patients and all members of their family showed that the disease had quite a strong familial character.
Y. Yamao

552—HUTTON, P. W. & HOLLAND, J. T., 1960. [Uganda Medical Department.] "Schistosomiasis of the spinal cord. Report of a case." **British Medical Journal,** Year 1960, **2** (5217), 1931–1933.

553—IBRAHIM, M. & GIRGIS, B., 1960. "Bilharzial cor pulmonale. A clinico-pathological report of 50 cases." **Journal of Tropical Medicine and Hygiene, 63** (3), 55–58.

554—JACKSON, J. H., 1958. "Bilharzia. A background to its endemicity and control in Africa with particular reference to irrigation schemes." **South African Journal of Laboratory and Clinical Medicine, 4** (1), 1–54.
This short monograph is divided into five parts under the headings: The Definitive Host, The Snail Vectors of Bilharzia in Africa, The Parasites of Human Bilharzia, Water as a Vector of Bilharzia and The Control of Bilharzia Transmission. A bibliography of 91 references is given. While admitting that *Schistosoma* is steadily spreading in Africa, the author considers that resignation in the face of apparent, rather than real, difficulties in control is responsible for much schistosomiasis, and with this in mind he has attempted to give the essential factors operating in the transmission of the disease, and to show how an endemic situation can be assessed and control measures devised.
D. F. Mettrick

555—KIM, S. G., 1957. [Roentgen picture of the cerebral form of paragonimiasis.] **Voprosi Neirokhirurgii, 21** (6), 12–14. [In Russian.]

556—KLOETZEL, K., 1958. [Hospital das Clínicas da Universidade de São Paulo.] "Considerações sôbre o emprêgo do miracil D no tratamento da esquistossomóse mansônica." **Revista Brasileira de Medicina, 15** (2), 87–90. [English summary p. 90.]
61 patients living in the endemic zone of Pernambuco State whose ages ranged from four-and-a-half to 59 years received ambulant treatment with miracil-D at a rate of 100 mg. per kg.

body-weight, using 0·2 gm. tablets after meals, for periods depending on the patient's weight. The maximum dose was 30 tablets in 10 days. Side effects, mainly nausea and vomiting beginning on the fourth or fifth day, were frequent and certain nervous symptoms were also common. Chlorpromazine was effective in preventing these side effects. Of 43 patients examined not less than one to two months after the end of treatment 31 showed apparent cure.

W. K. Dunscombe

557—KLOETZEL, K., 1958. "A síndrome hépato-esplênica na esquistossomose mansônica. (Considerações sôbre a incidência familiar)." **Revista Brasileira de Medicina, 15** (4), 263–265. [English summary p. 265.]

Out of the 119 schistosomiasis mansoni patients seen a noteworthy finding was the high incidence of splenomegaly in members of certain families. Members of the families of 21 patients were seen and in 76% of cases at least two members of the family had enlarged spleens. It is suggested tentatively that there may be some familial predisposition to the hepatosplenic form of this infection as it was ascertained that the initial exposure to infection differs among children in the same family and the age difference between members of the same family having enlarged spleens is frequently considerable. W. K. Dunscombe

558—KLOETZEL, K., 1959. [Departamento de Parasitologia, F.M.U.S.P., Rio de Janeiro, Brazil.] "Algumas observações de epidemiologia da esquistossomose na infância." **Hospital. Rio de Janeiro, 55** (5), 661–669. [English summary pp. 667–668.]

A previous investigation having shown only one positive case out of 157 children aged 0–3 years in an endemic area, a further more detailed examination was made using 5 gm. quantities of faeces. Out of 148 children six months to three years old, 13 were positive for *Schistosoma mansoni*, two in the one to two-year-old group and 11 in the two to three-year-old group. All were autochthonous. One small stream in the town was found infected; the vector was *Tropicorbis centimetralis* (infection rate 0·6%). W. K. Dunscombe

559—KLOETZEL, K. & KLOETZEL, J., 1958. "A síndrome hépatoesplenica na esquistossomose mansônica. Considerações sôbre uma série de 119 casos." **Revista Brasileira de Medicina, 15** (3), 172–178. [English summary p. 178.]

560—KOLMAKOVA, L. F., 1957. [Kafedra fakultetskoi terapii, Tomski meditsinski institut, Tomsk, U.S.S.R.] [Functional state of the liver in opisthorchiasis.] **Terapevticheski Arkhiv, 29** (8), 55–60. [In Russian.]

561—KOLMAKOVA, L. F., 1959. [Fakultetskaya terapevticheskaya klinika, Tomski meditsinski institut, U.S.S.R.] [The results of treatment of opisthorchiasis in man with hexachlorethane.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 28** (4), 427–430. [In Russian: English summary p. 430.]

95 patients with opisthorchiasis were treated with one or two courses of hexachlorethane. Symptoms were relieved and the intensity of infection was abated but radical cures were obtained in only two cases. Unfavourable side effects and transient moderate disturbances in liver function were observed in 60% of the patients. G. I. Pozniak

562—KOMIYA, Y. ET AL., 1960. [Department of Parasitology, National Institute of Health, Tokyo, Japan.] [The distribution of *Clonorchis sinensis* around Lake Biwa, Shiga Prefecture.] **Japanese Journal of Parasitology, 9** (2), 162–166. [In Japanese: English summary p. 166.]

In the winters of 1958 and 1959, Komiya *et al.* made researches on the distribution of *Clonorchis sinensis* around Lake Biwa in Shiga Prefecture. Metacercariae were harboured by five species of fish, *Rhodeus ocellatus*, *Gnathopogon elongatus elongatus*, *Sarcocheilichthys variegatus*, *Pseudorasbora parva* and *Triboldon hakonensis*. Infection rate among people in the districts around the lake was 2·5% to 54·2%. Incidence of infection among inhabitants of the region east of the lake was higher than that among people living south and west of the lake. It was particularly high among residents on the shore of the lake. Y. Yamao

563—LEITE, G., 1958. "Simpósio sôbre esquistossomose. Organizado pelo Hospital Naval do Salvador." **Revista Brasileira de Medicina, 15** (4), 249–258. [English summary p. 258.]

This symposium held at Salvador (Bahia Province) dealt with numerous problems of infection by *Schistosoma mansoni*. The generic name *Taphius* was approved for the planorbid vector; this included six Brazilian species three of which are proved vectors (*T. glabratus*, *T. nigricans* and *T. centrimetralis*). Rapid schemes of treatment (one day) were rejected. There is no racial difference in incidence in Brazil but the hepato-splenic form is much less frequent in coloured persons.

W. K. Dunscombe

564—MEYUS, H., CLERX, J. & EVENS, F., 1960. [Service d'Etude et de Coordination de la Lutte Antipaludique, S.E.C.L.A., Ministère de la Santé, Léopoldville, Belgian Congo.] "La bilharziose à *Schistosoma mansoni* du sud du Lac Kivu." **Rivista di Parassitologia, 21** (3), 165–198. [English & Italian summaries pp. 196–197.]

Investigations carried out in five islands in the south of Lake Kivu and its Ruanda littoral, showed that in all cases schistosomiasis was due to *Schistosoma mansoni*. Malacological surveys revealed the presence of *Planorbis pfeifferi*, *P. kivuensis*, *Bithynia alberti*, *Bulinus coulboisi*, *Gyraulus natalensis*, *Segmentina*, *Lymnaea alberti* and *Melanoides*. Of these, only *P. kivuensis* was found to emit *Schistosoma mansoni* cercariae. The incidence in these molluscs was much lower (0·5% to 0·69%) than the incidence of schistosomiasis among the inhabitants, which exceeded 59% in the islands, but was much lower (5·4% to 11·2%) on the Ruanda shore itself. Fishermen were the most affected. Practically no clinical symptoms were observed and the parasite's eggs were few in the faeces. Sodium pentachlorophenate, applied at a rate of 110 gm. per sq.m. once every three to six months, was found to be a reasonably effective means of controlling the vector. Lucanthone hydrochloride, given for 20 days, at a dose of 750 mg. per day gave a rate of cure of some 83%.

N. Jones

565—NIEDMANN, G., 1960. "Un caso de distomatosis hepática." **Boletín Chileno de Parasitología, 15** (3), 61–62. [English summary p. 61.]

566—RIBAKOVA, N. I., 1958. [X-ray diagnosis of pulmonary paragonimiasis.] **Vestnik Rentgenologii i Radiologii, 33** (4), 7–11. [In Russian: English summary p. 11.]

567—SAKAMOTO, Y., 1957. [Department of Parasitology, Tokushima University School of Medicine, Tokushima, Japan.] [An epidemiologic survey of human paragonimiasis in Kochi Prefecture.] **Shikoku Acta Medica, 11** (5), 560–571. [In Japanese: English summary p. 560.]

In Kochi Prefecture, antigen extracted from dried adult *Paragonimus westermani* was injected intradermally in about 31,000 schoolchildren as a screening test for paragonimiasis. Of the 17,735 primary schoolchildren tested, 586 (3·3%) were positive to the test. Of the 12,327 middle school students tested, 772 (6·3%) were positive to the test. Human paragonimiasis was most prevalent in the central part of Kochi Prefecture, along the River Niyodo; the basin of the River Shimanto in the western part of the Prefecture showed a slightly lower infection rate.

Y. Yamao

568—SANTOS, M. R. DOS, 1959. [Departamento de Higiene e Medicina Tropical, Estado de São Paulo, Brazil.] "Consideracões sôbre o emprêgo da arsenoterapia na esquistossomose mansoni. (Nota prévia.)" **Hospital. Rio de Janeiro, 55** (4), 563–565.

Four men, four women and two children with schistosomiasis mansoni were treated with an arsenical drug, Eparsenol, 0·12 gm. being given intravenously for three consecutive days together with 3 gm. orally of a methionine-protein compound, to protect against possible toxic effects of the arsenical. When faeces and rectal biopsy specimens were examined 48 hours after treatment ended, eight cases were negative and two became so four to five days later. Subsequently dosage was reduced to two doses of 0·12 gm., and then to one dose of 0·2 gm.

W. K. Dunscombe

569—SCHLESINGER, F. G., 1960. "Een geval van distomatose in Nederland." **Nederlands Tijdschrift voor Geneeskunde, 104** (6), 285–286. [English summary p. 285.]
A 61-year-old woman who had complained of abdominal pain for 20 years was operated on for radiologically proved duodenal ulcer and suspected gall-stones. A *Fasciola hepatica* was found in the common bile-duct, and recovery after operation was apparently complete.
W. K. Dunscombe

570—SCHWETZ, J., 1957. "Sur l'état actuel du problème des bilharzioses en Afrique centrale et tout particulièrement au Congo Belge." **Mémoires de l'Académie Royale des Sciences Coloniales. Classe Sciences Naturelles et Médicales, Série in-8°, 5** (4), 1–90.
Schwetz discusses the problems of schistosomiasis in central Africa, with particular reference to the Belgian Congo. After a brief introduction, in which he cites various authors' opinions of the disease and its importance and gives a short historical account, he enumerates the various species of *Schistosoma* which are involved. This is followed by an account of the fresh-water snail vectors, their classification, nomenclature and ecology. Each species of schistosome, the disease it causes in man or animals and its intermediate hosts are then dealt with in separate chapters. The last three chapters are devoted to diagnosis, treatment and prophylaxis. In his conclusion Schwetz emphasizes the need for further work on the role of wild rodents in the transmission of intestinal schistosomiasis in man and on the presence or absence of premunition in man.
S. Willmott

571—SEKI, T. & OTSURU, M., 1960. [Department of Medical Zoology, School of Medicine, Niigata University, Niigata, Japan.] [An endemic area of paragonimiasis in Fukushima Prefecture.] **Japanese Journal of Parasitology, 9** (3), 309–313. [In Japanese: English summary p. 313.]
Mass observations of the endemicity of paragonimiasis were made in the coastal region of Fukushima Prefecture in 1959. Seki & Otsuru found that paragonimiasis was endemic in the basin of the River Mano in Fukushima Prefecture and that 6·8% of *Eriocheir japonicus* from the River Mano harboured metacercariae of *Paragonimus westermani*.
Y. Yamao

572—SMITH, F. M. & GELFAND, M., 1958. "Bilharziasis in the African infant and child in the Mtoko district, Southern Rhodesia." **Central African Journal of Medicine, 4** (7), 287–288.
27 infants under two years of age and 63 children between four and twelve years of age were examined for bilharziasis. The main clinical features of the disease in children are given. Children under two years old were found to be infrequently infected in comparison with those of four years and over. Because the young infants were in fact bathed in infected pools, it is suggested that a state of tolerance or acquired resistance is conferred, in an endemic area, on a young infant born of a mother who is herself either infected or has suffered from the disease in the past.
D. F. Mettrick

573—TARIVERDIEV, G. Z., 1960. [Kafedra propedavtiki vnutrennikh boleznei, Lechebno-profilakticheski fakultet, Azerbaidzhanski meditsinski institut imeni N. Narimanova, U.S.S.R.] [Two cases of fascioliasis.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (3), 354. [In Russian.]

***574**—TERZIEV, G., ZOGRAFSKI, B., DRACHEV, I., MITROVA, D. & TSVETKOV, D., 1957. [Clinical considerations on pulmonary distomiasis in Korea.] **Suvremenna Meditsina. Sofia, 8** (3), 19–31. [In Bulgarian.]

575—VASCONCELLOS, D., LINS, J. C. & MORAES, T., 1958. [Seção de Gastrenterologia Faculdade de Medicina, Recife, Brazil.] "Proteinemia e provas de labilidade plasmática na esquistossomose mansoni." **Hospital. Rio de Janeiro, 53** (6), 811–818.
Vasconcellos *et al.* studied 71 patients suffering from *Schistosoma mansoni* infections and divided them into three groups: (i) 19 cases with the hepato-intestinal form; (ii) 20 cases with compensated disease; and (iii) 32 cases with decompensated hepato-splenic schistosomiasis. Liver function tests were carried out and serum electrophoresis readings made. The changes

found, which were not specific in any way, were most marked in the third group, with hyperproteinaemia, inversion of the A/G ratio, occasional high α-1 globulin and α-2 globulin and considerably increased γ-globulins. W. K. Dunscombe

*576—WENG, H. C. ET AL., 1959. [Combined emetine with chloroquine in the treatment of clonorchiasis: report of 11 cases.] **Chinese Journal of Internal Medicine, 7** (12), 1175. [In Chinese.]
Simultaneous treatment with emetine and chloroquine was applied in 11 cases of *Clonorchis sinensis* infection. Seven of these had already been treated with chloroquine alone. Emetine was given subcutaneously in daily doses of 0·03 gm., not exceeding a total of 0·6 gm. The total dose of chloroquine ranged from 4·2 gm. to 30 gm. in terms of chloroquine base. Eggs disappeared from the faeces and bile in 10 cases and their number was greatly reduced in the other case. The cured cases were followed up for two months to two years; reappearance of eggs in the faeces was observed in only one, in which complete cure followed further administration of 20 gm. of chloroquine alone. Side effects were present in all cases and were more severe than in cases treated with either of the drugs alone. Hence it is suggested that simultaneous administration of emetine and chloroquine should be limited to cases of failure or relapse after chloroquine treatment. [Based on an abstract in **Chin. Med. J. Peking, 1960, 80,** p. 75.] N. Jones

577—YAMAGUCHI, T., NISHIMOTO, M., SAKAMOTO, Y., HIROSE, H. & SHIGEYASU, M., 1958. [Department of Pathology, Tokushima University School of Medicine, Tokushima, Japan.] [An epidemiological survey of paragonimiasis in Takaoka-cho, Kochi Prefecture. 2.] **Shikoku Acta Medica, 13** (1), 105–110. [In Japanese: English summary p. 105.]
A survey of human paragonimiasis was conducted at Takaoka-cho, Kochi Prefecture from 15th to 25th April 1958. First an intradermal test was employed for screening paragonimiasis. Then sputa were examined for eggs in persons positive to the intradermal test. Out of a total of 2,727 persons tested 632 were positive to the intradermal test. Of these 249 were examined for eggs in the sputa and 18 (7·2%) were found positive. Y. Yamao

578—YAMAGUCHI, T., YOSHINO, K., SAKAMOTO, Y. & HIROSE, H., 1958. [Department of Pathology, Tokushima University School of Medicine, Tokushima, Japan.] [A case of subcutaneous tumour caused by lung fluke (*Paragonimus westermani*).] **Shikoku Acta Medica, 13** (2), 261–263. [In Japansese: English summary p. 261.]
An immature lung fluke, *Paragoninus westermani*, about 2·5 mm. in length, 1·8 mm. wide and 0·99 mm. thick was found in a subcutaneous tumour which was surgically removed from the right side of the abdomen of a five-year-old Japanese girl in Kochi Prefecture.
Y. Yamao

579—ZAHER, M. F., BADR, M. M. & FAWZY, R. M., 1959. [Department of Urology, Kasr El-Eini Hospital, Egypt.] "Bilharzial urinary fistula with report on 50 cases." **Journal of the Egyptian Medical Association, 42** (6/7), 412–419.

Cestoda

*580—AGOPYAN, K. & PANTEV, I., 1957. [Echinococcal dissemination. Prehilar pulmonary echinococcus perforating into the pulmonary artery.] **Suvremenna Meditsina. Sofia,** 8 (5), 97–102. [In Bulgarian.]

581—ANSIMOV, A. F., 1960. [Republikanskaya bolnitsa, Chechen-Ingush A.S.S.R., U.S.S.R.] [The spread and treatment of echinococcosis in the Chechen-Ingush A.S.S.R.] **Sovetskaya Meditsina, 25** (8), 80–84. [In Russian.]
Hydatidosis is comparatively common in the Chechen-Ingush A.S.S.R., about six to seven cases entering hospital annually, and its frequency among surgical cases is 0·8%. Ansimov discusses the diagnosis and surgical findings of 120 cases. In 69 the site of localization was the liver, in 22 the lung, and in the remainder the spleen, the abdominal lumen and wall, the pelvis, the kidneys, or the frontal sinus and cranium. 118 were of the simple and only two of the alveolar type. G. I. Pozniak

582—ARSLANOVA, A. K., 1960. [Kafedra epidemiologii, Kazakhski meditsinski institut, Alma-Ata, U.S.S.R.] [Alveolar echinococcosis in southern Kazakhstan.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (3), 349–350. [In Russian: English summary p. 350.]
Arslanova studied 19,837 post-mortem reports from five hospitals in southern Kazakhstan, mainly for the period from 1941 to 1957. The incidence of hydatid was 0·49%, of which two-thirds were unilocular and one-third alveolar cysts. The latter was mostly localized in the liver and was predominant among men, 19 out of 33 cases being males; it was most frequent among the 30 to 50-year-old group. Unilocular hydatid prevailed among women. Comparing these data with those obtained by Zakharov [for abstract see Helm. Abs. **14**, No. 426j], the author concludes that since then the incidence of alveolar hydatid found at autopsy in Alma-Ata, has decreased to a quarter of its former value. N. Jones

583—ASTAKHOVA, E. I., 1958. [Echinococcal cysts of the pericardium.] **Vestnik Rentgenologii i Radiologii, 33** (4), 77–78. [In Russian.]

584—BERUCHASHVILI, L. Z., 1957. [Observations of cysticerciasis of the forth ventricle.] **Voprosi Neirokhirurgii, 21** (6), 48–49. [In Russian.]

585—BREGADZE, I. L. & KONSTANTINOV, V. M., 1960. [Kafedra gospitalnoi khirurgii, Novosibirski meditsinski institut, U.S.S.R.] [Errors in the diagnosis of the larval form of *Echinococcus* in man.] **Sovetskaya Meditsina, 25** (8), 77–80. [In Russian: English summary p. 80.]
The authors quote several cases, chiefly from Russian literature, where unilocular hydatid cysts have been mistaken by the surgeon for the alveolar form and *vice versa*. Such mistakes are avoided when the character of the two types of infection is well understood and systematic histological examinations are undertaken. Further the authors point out that in their experience of 80 alveolar and 54 unilocular cases of echinococcosis, no mixed infections of the liver occurred. G. I. Pozniak

586—CABANIÉ, G. & LAMY, L., 1960. [Hôspital du Marsham, Tanger.] "Malformation de la vésicule hydatique dans un volumineux kyste du foie." **Bulletin de la Société de Pathologie Exotique, 53** (1), 41–43.
Cabanié & Lamy describe and illustrate a unilocular hydatid cyst, which was removed from the liver of a 35-year-old woman in Tangier. The cyst was 15 cm. in diameter and its inner surface was covered with cauliflower-like masses among which were brood capsules with numerous scoleces. N. Jones

587—CHEBOTAREVA, N. M., 1957. [Novosibirski institut ortopedii, travmatologii i vosstanovitelnoi khirurgii, Novosibirsk, U.S.S.R.] [Clinical aspects of cysticerciasis of the brain.] **Voprosi Neirokhirurgii, 21** (6), 44–45. [In Russian.]

588—DICK, E. T., 1959. "Hydatid cyst of the spleen." **New Zealand Medical Journal, 58** (327), 629–632.

589—DONCKASTER, R., GODOY, M. & MORALES, I., 1960. [Departamento de Parasitología, Centro de Gastroenterología del Hospital Clínico "José Joaquin Aguirre", Universidad de Chile.] "Tratamiento de la teniasis por intubación duodenal: (a) con solución hipertónica de sulfato de magnesia y (b) con acridínico en solución isotónica." **Boletín Chileno de Parasitología, 15** (2), 29–31. [English summary p. 29.]
17 persons, aged from 9 to 46 years, three of whom were passing proglottides of *Taenia solium* and the remainder *T. saginata* and in whom oral treatment had failed, were treated by drugs given through a duodenal tube (position confirmed by X-rays) as follows: group A—five patients with *T. saginata* were given a magnesium sulphate and glycerin mixture; group B—14 patients with *T. solium* or *T. saginata* were given 0·9 gm. of Metoquina (a dihydrochloride of butyl aminoacridine) dissolved in an isotonic solution; a saline purgative was given later. By the first method only one patient with *T. saginata* was cured and side effects were considerable. In the second group, two out of the three patients with *T. solium* and nine of the eleven with *T. saginata* were cured and side effects were minimal. [Presumably the figure of 17 for the total should be 19.] W. K. Dunscombe

590—EPSHTEIN, S. I., 1960. [Parazitologicheski otdel, Basseinovaya sanitarno-epidemiologicheskaya stantsiya, Nizhne-Volzhski vodzdravotdel, U.S.S.R.] [A case of *Dipylidium* infection in a ten-month-old child.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (3), 352–353. [In Russian.]

A ten-month-old baby with *Dipylidium* infection continued to pass proglottides in the faeces after treatment with pumpkin seed decoction, followed by magnesium sulphate. Complete cure was obtained by dieting the infant for two days and then giving magnesium sulphate in the evening, male fern extract the following morning (on an empty stomach) and acrichin, followed by magnesium sulphate after one hour. N. Jones

591—EPSTEIN, E., PROCTOR, N. S. F. & HEINZ, H. J., 1959. [Ophthalmological Department, Boksburg-Benoni Hospital, Johannesburg.] "Intra-ocular coenurus infestation." **South African Medical Journal, 33** (29), 602–604.

Details, including operational notes and pathological findings, are given of an intra-ocular infection with a coenurus of *Multiceps multiceps* in a European child. This is only the third case on record of such an infection. Some aspects of intra-ocular helminth infections are briefly discussed. D. F. Mettrick

592—ESPEROV, B. N., 1957. [Kafedra gospitalnoi khirurgii, Kuybyshevski meditsinski institut, Kuybyshev, U.S.S.R.] [Echinococcosis of the thoracic wall.] **Voprosi Neirokhirurgii, 21** (6), 53–54. [In Russian.]

593—FRANÇA, O. H. DA, 1958. "Intoxicação ou alergização pela taenia?" **Hospital. Rio de Janeiro, 53** (3), 427–430.

This is a report of a case of pruritus in a 28-year-old white male, which was improved by intravenous calcium treatment, the condition relapsing when treatment was suspended. Faecal examination showed occasional eggs of *Taenia* spp. After treatment with a mixture containing triturated pumpkin seeds no more eggs were found and the skin trouble ceased. W. K. Dunscombe

594—GLEASON, N. N., 1960. [United States Public Health Service, Communicable Diseases Center, Atlanta, Georgia, U.S.A.] "Human sparganosis in Alabama." **Journal of Parasitology, 46** (2), 230.

Gleason reports on an unidentified case of sparganosis in a woman in Alabama. The pseudophyllidean larva which was recovered on lancing of a nodule near the right breast, measured 94 mm. by 4 mm. and had a club-shaped anterior end with a shallow groove and a thin irregular posterior end. G. I. Pozniak

595—GORDADZE, G. N. & GIGITASHVILI, M. S., 1959. [Klinicheski otdel, Institut malyarii, meditsinskoi parazitologii i gelmintologii, Ministerstvo zdravookhraneniya S.S.S.R.] [Epileptic fits caused by *Hymenolepis nana* infection.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 28** (4), 430–434. [In Russian: English summary pp. 433–434.]

Of 26 cases with epileptic fits due to *Hymenolepis nana* infection, 62·3% were in children aged seven to fifteen years. In 77% of patients the fits were associated with the complete loss of consciousness. Aura was observed in half of the patients and, in contrast to non-parasitic epilepsy, was expressed most frequently by the intensification of any one of the symptoms characteristic for hymenolepidiasis (nausea, headache, abdominal pain, etc.). G. I. Pozniak

*596—GRIPONISSIOTIS, B., 1957. "Hydatid cyst of the brain and its treatment." **Neurology. Minneapolis, 7** (11), 789–792.

597—ICHINKHOROLOO, V., 1958. [Carbohydrate metabolism in echinococcosis of the liver.] **Khirurgiya. Moscow, 34** (12), 34–36. [In Russian: English summary pp. 35–36.]

598—LASS, N., NITZANI, C. & PAUL, Z., 1957. "Hydatid disease in Israel (echinococcosis)." **Hebrew Medical Journal. New York, 2,** 194–200.

*599—MENDELEEV, I. M., 1957. [*Diphyllobothrium* anaemia.] **Petrozavodsk:** 106 pp. [In Russian.]

600—MILMAN, N. Y., 1958. [A case of calcified renal hydatid cyst.] **Vestnik Rentgenologii i Radiologii, 33** (4), 78–79. [In Russian.]

601—MOLDENHAUER, W. & ZIEGLER, K., 1960. [Medizinische Universitätsklinik Rostock, West Germany.] "Klinische und röntgenologische Merkmale der Zystizerkose des Menschen." **Zeitschrift für Tropenmedizin und Parasitologie, 11** (4), 441–448. [English summary p. 447.]

602—NYBERG, W., 1960. [Department of Medicine, Vasa Central Hospital, Vasa, Finland.] "The influence of *Diphyllobothrium latum* on the vitamin B_{12}-intrinsic factor complex. I. In vivo studies with Schilling test technique." **Acta Medica Scandinavica, 167** (3), 185–187.

In experiments designed to ascertain the mechanism whereby the absorption of vitamin B_{12} is disturbed by the presence of *Diphyllobothrium latum*, the Schilling test, used on ten patients with pernicious anaemia due to the worm, 15 non-anaemic worm carriers and 75 genuine cases of pernicious anaemia, indicates that the tapeworm influences the B_{12}-intrinsic factor complex and/or has a blocking effect on the intestinal mucosa which inhibits the absorption of B_{12}. R. T. Leiper

603—NYBERG, W., 1960. [Department of Medicine, Vasa Central Hospital, Vasa, Finland.] "The influence of *Diphyllobothrium latum* on the vitamin B_{12}-intrinsic factor complex. II. In vitro studies." **Acta Medica Scandinavica, 167** (3), 189–192.

In vitro experiments on *Diphyllobothrium latum* are described which support Nyberg's opinion that this tapeworm is capable of splitting the B_{12}-intrinsic factor complex and of impairing the B_{12} binding capacity of IF. As the worm liberates B_{12} bound to human gastric juice more easily than when bound to pig IF., the latter is unsuitable for *in vitro* experiments. R. T. Leiper

604—NYBERG, W., GRÄSBECK, R. & SIPPOLA, V., 1958. [Department of Medicine, Vasa Central Hospital, Vasa, Finland.] "Urinary excretion of radiovitamin B_{12} in carriers of *Diphyllobothrium latum*." **New England Journal of Medicine, 259** (5), 216–219.

Nyberg *et al.* carried out Schilling's urinary radio-activity test on 50 non-anaemic carriers of *Diphyllobothrium latum*, on seven tapeworm carriers with megaloblastic anaemia, on 16 patients with genuine pernicious anaemia and on 50 healthy control subjects. The tapeworm carriers underwent the test before and after treatment with male fern. The results showed that the daily average of labelled vitamin B_{12}, excreted with the urine was significantly lower in both anaemic and non-anaemic carriers of *Diphyllobothrium* than in the controls, the lowest values being observed in the anaemic subjects. Urinary excretion increased significantly after expulsion of the tapeworms. It is suggested that *D. latum* may, in fact, be a number of species. N. Jones

605—PARFENOVA, N. D., 1957. [Kafedra rentgenologii i radiologii, Saratovski meditsinski institut.] [Three cases of echinococcosis of the kidney.] **Vestnik Rentgenologii i Radiologii, 32** (6), 74–78. [In Russian.]

606—PETUKHOV, M. I., 1957. [Kuybyshevski meditsinski institut, Kuybyshev, U.S.S.R.] [The spread and treatment of hydatid disease in Kuybyshev region.] **Khirurgiya. Moscow, 33** (11), 85–89. [In Russian.]

607—ROSEN, S. W. & KIEFER, E. D., 1958. [Department of Gastroenterology, Lahey Clinic, Boston, U.S.A.] "Treatment of tapeworm infestation. Report on an effective treatment without toxic effects on host." **Journal of the American Medical Association, 167** (17), 2065–2067.

38 patients infected with *Taenia saginata* or *T. solium* received through a duodenal tube 1·5 oz. magnesium sulphate solution, 1·5 oz. glycerin, 2 oz. of a glycerin and magnesium sulphate mixture and 500 c.c. sterile saline warmed to 54°C. to 60°C. In most the entire worm was passed 10 to 15 minutes later. 31 patients passed strobilae and scoleces, five patients did not pass scoleces but did not show evidence of continued infection at follow up. In two patients the treatment failed. Two other patients were unable to tolerate intubation. J. E. D. Keeling

608—SHEKHTMAN, E. M., 1958. [Leningradski sanitarno-gigienicheski meditsinski institut, U.S.S.R.] [Anaemia in a pregnant woman due to *Diphyllobothrium* infection.] **Akusherstvo i Ginekologiya, 34** (4), 39–41. [In Russian: English summary p. 41.]

609—SIGALOV, A. B., 1958. [Akushersko-ginekologicheskaya klinika, Stalinski meditsinski institut, Baza klinicheskoi bolnitsi imeni K. E. Voroshilova, U.S.S.R.] [Two cases of echinococcosis of the female genitalia.] **Akusherstvo i Ginekologiya, 34** (5), 115–116. [In Russian.]

610—SIROTINA, E. I., 1957. [Ukrainski nauchno-issledovatelski psikhonevrologicheski institut, U.S.S.R.] [Alveolar echinococcosis of the brain.] **Voprosi Neirokhirurgii, 21** (6), 51–53. [In Russian.]

*611—STOYANOVA, Z., 1957. [Renal echinococcosis simulating nephrolithiasis.] **Suvremenna Meditsina. Sofia, 8** (4), 85–86. [In Bulgarian.]

*612—TERZIEV, G., 1957. [Report of a case of subcutaneous generalized cysticerciasis.] **Suvremenna Meditsina. Sofia, 8** (4), 95–99. [In Bulgarian.]

*613—TODOROV, R., 1957. [Comparative results of the treatment of taeniasis.] **Suvremenna Meditsina. Sofia, 8** (10), 83–88. [In Bulgarian.]

614—VASIN, N. Y., 1957. [Nauchno-issledovatelski ordena Trudovogo Krasnogo Znameni institut neirokhirurgii imeni akad. Burdenko Akademii meditsinskikh nauk SSSR.] [Clinical aspects and diagnosis of cysticerciasis of the fourth ventricle.] **Voprosi Neirokhirurgii, 21** (6), 46–47. [In Russian.]

615—VUCOSIC, A., VIAL, S., MARSANO, A. & JARPA, A., 1960. "Un caso de ascitis de origen hidatídico." **Boletín Chileno de Parasitología, 15** (3), 60–61. [English summary p. 60.]

616—WHITE, P. J., 1958. [Department of Health, Victoria, Australia.] "Mortality from hydatid disease in Victoria, 1853 to 1956." **Medical Journal of Australia,** 45th Year, **2** (12), 378–381.
White records that there were 2,782 deaths from hydatid disease from 1853 to 1956 in the State of Victoria, Australia. Of these deaths 1,574 occurred in males and 1,204 in females. Using age specifying rates for different age groups between 1871 to 1950 in ten-year periods, White shows that there has been a drop in mortality in Victoria and that in the 1941 to 1950 period, the crude mortality figures were heavily salted by patients in the older age groups.
M. A. Gemmell

Nematoda

617—ALURRALDE, Jr., P., 1957. [Catedra de Microbiologia and Parasitologia, Buenos Aires, Argentina.] "Ascariadiasis en la Republica Argentina. Su tratamiento con la piperazina." **Prensa Médica Argentina, 44** (51), 3673–3675.
Eleven cases of ascariasis were successfully treated with piperazine hexahydrate. The results of examinations on 20,000 faecal samples obtained in the Department of Microbiology and Parasitology are presented. The over-all incidence of ascariasis was 70%. J. E. D. Keeling

618—ASAMI, K., ET AL., 1960. [Department of Parasitology, School of Medicine, Keio University, Tokyo, Japan.] [Experimental evaluation of ascaricidal effects of domoic acid extracted from *Chondria armata*.] **Japanese Journal of Parasitology, 9** (3), 290–293. [In Japanese: English summary p. 293.]
Domoic acid was given to carriers of *Ascaris lumbricoides* in a single dose before breakfast. Of 31 cases treated with 10 mg., 21 had become negative two weeks later. No side effects were recognized even when as much as 40 mg. was given. Asami *et al.* state that a single dose of domoic acid is more effective than santonin or kainic acid in removing *Ascaris*.
Y. Yamao

619—BROWNE, S. G., 1959. [Léproserie de Yalisombo, Province Orientale, Belgian Congo.] "La gale filarienne et la lèpre." **Annales de la Société Belge de Médecine Tropicale, 39** (3), 257–265. [English, German, Spanish & Flemish summaries pp. 264–265.]

Browne has studied 131 cases in an area where leprosy and *Onchocerca volvulus* infection are highly endemic. He draws attention to the possibility of confusing cutaneous onchocerciasis with leprosy and vice versa, and gives the diagnostic features of the former. N. Jones

620—BUDZHE, M. M., BLYUGER, A. F., DAKHOVKER, S. E., LAZDINYA, M. A. & SHENIGSON, B. S., 1959. [Institut organicheskogo sinteza, Akademiya nauk Latviskoi S.S.R.] [Comparative study of different methods of treatment of ascariasis with piperazine salts.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 28** (4), 436–438. [In Russian: English summary p. 438.]

The authors have shown that for ascariasis in man, the usual three-day course of treatment with 9 gm. of piperazine adipate or phosphate can be substituted, in mass treatment, by a more convenient two-day course (retaining the same total dose) or a one-day course (reducing the dose by one-third). The reduction in efficacy and tolerance is relatively small. G. I. Pozniak

621—CERF, J., 1958. "Traitement de la strongyloïdose par la dithiazanine." **Annales de la Société Belge de Médecine Tropicale, 38** (6), 1027–1029. [English, German, Spanish & Flemish summaries pp. 1028–1029. Discussion pp. 1029–1030.]

Cerf treated 57 cases of strongyloidiasis with hard sugar-coated pills of Telmid (dithiazanine iodide) at a dose level of 20 mg. per kg. body-weight to a maximum dose of 600 mg. each day. Daily faecal examinations were performed on each case, treatment being discontinued when a negative sample was obtained. Apparent cures were followed up with a single faecal examination eight days later. All cases received treatment on one day, 44 cases on two days, 14 cases on three days and two cases on four days. Cures obtained in these groups were eight (14%), 22 (50%), 10 (70%) and two (100%) respectively. Vomiting was encountered on four occasions.

J. E. D. Keeling

622—CHOYCE, D. P., 1960. "Onchocerciasis and its relationship to blindness." **Journal of Tropical Medicine and Hygiene, 63** (1), 21–22.

In a discussion of Rodger's recent report on blindness in West Africa it is pointed out that most of Rodger's patients were simultaneously affected with other conditions and that it is difficult to find a community where onchocerciasis is hyperendemic but where other eye conditions are absent. From his experience at the Hospital for Tropical Diseases, London, Choyce considers that the amount of blindness caused by onchocerciasis has been exaggerated and "River Blindness" may possibly be due to some as yet unrecognized factor.

W. K. Dunscombe

623—CHU, S. F., SUN, C. H. & CHEN, H. H., 1959. [Department of Infectious Diseases and Epidemiology, Chung-San Medical School, China.] [Observations on filariasis in Chung Hua Hsien, Kwangtung.] **Acta Microbiologica Sinica, 7** (1/2), 25–31. [In Chinese: English summary p. 31.]

Wuchereria bancrofti was found endemic around the town of Tse Kao. 415 of the 1,450 farmers examined by blood smears and physical examinations were positive. The rate of infection rises with age, being highest in the 41 to 50 age group. Infection is twice as high in men as in women. *Culex fatigans* is the chief mosquito in houses, and among 1,134 dissected mosquitoes of this species 97 (8·55%) harboured larval stages of which 81 (7·23%) were identified as *W. bancrofti*. The other 16 (1·41%) larval nematodes were unidentified (but were not of the *malayi* type). Only two persons had mild elephantiasis of the legs, while 58 persons had a history of chyluria, distributed equally in both sexes. L. S. Yeh

624—CONSONI, R., 1958. [Roldãos Consoni, Med., Florianopolis, S.C., Brazil.] "Ascaridiase das vias biliares." **Revista da Associação Médica Brasileira, 4** (1), 54–57. [English summary p. 57.]

625—FAYEZ, M. & RAGHEB, M., 1959. [Department of Internal Medicine, Faculty of Medicine, Cairo University, Egypt.] "Gastroscopy in ancylostomiasis." **Journal of the Egyptian Medical Association, 42** (9), 505–508.

20 severe cases of *Ancylostoma duodenale* infection underwent radiological examination of the stomach, fractional test meal and gastroscopy. Radiology showed no abnormality but there was excess mucus, increased fasting juice with free acid absent in 15, and reduced in five, with greatly diminished total acidity in all. On gastroscopy the picture resembled atrophic gastritis. The test meal and gastroscopic findings are regarded as characteristic. W. K. Dunscombe

626—FIELD, T. E., SCHEUER, P. J. & TRIBE, C. R., 1959. [Pathology Laboratory, Far East, Singapore.] "Haemoglobin levels and helminthiasis in Malay recruits." **Journal of the Royal Army Medical Corps, 105** (3), 113–119.

The haemoglobin levels of 143 Malay recruits were investigated shortly after joining up, and again 13 weeks later. Faecal samples showed hookworm in 111, *Ascaris lumbricoides* in 75 and *Trichuris trichiura* in 94. Many had a double or triple infection. There was no correlation between infection rate and eosinophilia and the considerable improvement in haemoglobin level observed at the second examination was regarded as due entirely to the improved diet, since neither anthelmintic treatment nor any extra iron was given.

W. K. Dunscombe

*627—FONGI, E. G. & FRIZZA, A., 1957. "Triquinosis esporádica." **Medicina Panamericana. Buenos Aires, 9** (1), 11–16.

628—GADZHIEV, A. A., 1959. [Kafedra khirurgii, Institut usovershenstrovaniya vrachei, Ministerstvo zdravookhraneniya Azerbaidzhanskoi SSR.] [Intestinal obstruction caused by *Ascaris*.] [Abstract.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 28** (4), 426. [In Russian.]

*629—GAON, J., DORDEVIĆ, B., RAMOVIĆ, Š. & GALL, Z., 1957. [Epidemiology and laboratory diagnosis of trichinelliasis; 3 epidemics in villages of Bosnia and Hercegovina during 1955-56.] **Medicinski Arhiv. Sarajevo, 11** (6), 17–27. [In Serbian.]

630—GEFTER, V. A. & ZORIKHINA, V. I., 1959. [Sektor eksperimentalnoi parazitologii, Institut malyarii, meditsinskoi parazitologii i gelmintologii, Ministerstvo zdravookhraneniya SSSR.] [The study of the epidemiology of ascariasis by immunological and other methods.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 28** (4), 394–400. [In Russian: English summary p. 400.]

Although coprological examination of 77 nursery children detected *Ascaris* eggs in only 5·2%, as many as 49 of the children gave positive immunological reactions. Of these 43 were positive to microprecipitation on live larvae and to the agglutination test with carmine [for abstract see Helm. Abs., **25,** No. 465g], and 40 to the erythrocyte sedimentation test [for abstract see Helm. Abs., **23,** No. 667a]. Of the children positive to the microprecipitation test, two were negative in the erythrocyte sedimentation and seven in the agglutination tests, while seven of those negative to the microprecipitation reaction were positive to the other two tests. It is inferred that as the erythrocyte and the agglutination tests in combination give a somewhat higher efficacy in diagnosis, they should replace the microprecipitation reaction.

G. I. Pozniak

631—GOLSHMID, V. K., 1960. [Ascariasis and trichuriasis in southern Sakhalin.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (3), 354. [In Russian.]

632—GONZÁLEZ BARRANCO, D. & MAZZOTTI, L., 1959. [Instituto de Salubridad y Enfermedades Tropicales, México, D.F., Mexico.] "Tolerancia a la administración del tetracloretileno emulsionado en niños escolares." **Revista del Instituto de Salubridad y Enfermedades Tropicales. Mexico, 19** (1), 101–104. [English summary p. 104.]

45 girls, aged between one and 19 years, infected with *Enterobius* were treated after fasting with tetrachlorethylene emulsified in water mixed with a non-ionic fatty acid, at a dose rate of 0·1 c.c. per kg. body-weight. No purgative was given afterwards. Although the drug was well tolerated on the whole, the results were not satisfactory. 90% had slight side effects although vomiting occurred in only one patient. W. K. Dunscombe

633—GROVÉ, S. S. & ELSDON-DEW, R., 1958. [Department of Pathology, Faculty of Medicine, University of Natal, Durban.] "Internal auto-infection with *Strongyloides stercoralis*." **South African Journal of Laboratory and Clinical Medicine, 4** (1), 55–63. [Afrikaans summary p. 63.]

A fatal case of *Strongyloides stercoralis* infection in an adult Indian male in which the symptoms were those of pyloric obstruction is described. The case history is very briefly summarized but the autopsy findings are given in more detail. The life-cycle of the parasite is described and reports on previous cases are listed. D. F. Mettrick

634—HAYASHI, S., SATO, K. & OSADA, Y., 1959. [Department of Parasitology, Institute of Infectious Diseases, University of Tokyo, Tokyo, Japan.] [Studies on bancroftian filariasis in Aogashima Island in the Izu Archipelago.] **Japanese Journal of Parasitology, 8** (6), 895–903. [In Japanese: English summary p. 903.]

In 1958, from 18th June to 6th August, human filariasis was studied for the first time on Aogashima Island in the Izu Archipelago. Out of 317 inhabitants of the island 41 (12·9%) were proved carriers of bancroftian microfilariae. The mosquito fauna on this island was as follows: *Culex pipiens pallens*, *C. sasai*, *C. vorax*, *Aedes albopictus* and *A. togoi*. Only adult *C. pipiens pallens* were found in the houses. The residual effect of spraying D.D.T. (2 gm. per square metre) on to the inside walls of the houses was quite significant, a remarkable decrease in numbers of mosquitoes and flies being observed four days later. Diethylcarbamazine (supatonin) was administered to 41 carriers at 2 mg. per kg. body-weight for five days and 6 mg. per kg. for the following eight days. On the seventh day of the treatment, out of 12 cases re-examined, three cases (25%) were negative. The average number of microfilariae in 60 cu. mm. of blood was reduced to 14·3% of the initial count. Y. Yamao

635—JARPA, A. & MÁRQUEZ, J., 1960. [Cátedras de Parasitología y Medicina Interna, Universidad Católica de Chile.] "Triquinosis humana." **Boletín Chileno de Parasitología, 15** (2), 34–36. [English summary p. 34.]

Trichinelliasis is endemic in Chilè and for early diagnosis a blood film for eosinophilia and Bachman's intradermal test are advised. An illustrative case shows the necessity of considering this disease in cases where an infective syndrome has lasted more than five days without a diagnosis. Steroid therapy proved very helpful. W. K. Dunscombe

636—JORDAN, P., 1960. [East African Institute for Medical Research, Mwanza, Tanganyika Territory.] "Bancroftian filariasis in Tanganyika: observations on elephantiasis, microfilarial density, genital filariasis and microfilaraemia rates." **Annals of Tropical Medicine and Parasitology, 54** (2), 132–140.

Jordan presents the results of the examination of over 20,000 blood samples taken during the course of surveys of *Wuchereria bancrofti* infections in Tanganyika. Villages, in which similar microfilaraemia rates (defined as the percentage of adult males over the age of 16 years in whose blood microfilariae were found) were recorded, are grouped together for analysis purposes, five groups—termed "endemic" groups—of villages with different levels of infection being recognized. In all groups, the incidence of microfilariae in the blood increased with age, the density of microfilariae was greater in the higher age groups than in the younger groups and was also greater in males than in females. The genital filariasis rate (defined as the percentage of adult males with hydrocele, lymph scrotum or elephantiasis of the scrotum) was directly proportional to the mean microfilaraemia rate. In 330 cases of elephantiasis of the limbs, the proportion with microfilariae in the blood was low and it is suggested that there is an immunity to re-infection which results in, or is a result of, the elephantoid condition. P. Williams

637—JULLIEN, A., BOUVERET, P. & CARDOT, J., 1957. "Sur deux cas de filariose à *Loa loa*." **Bulletin de la Société d'Histoire Naturelle du Doubs,** No. 59, pp. 103–109.

638—KANGSADAL, P. & BOVORNKITTI, S., 1960. [Department of Medicine, Siriraj Hospital Medical School, Dhonburi, Thailand.] "A case of gnathostomiasis with spontaneous hydropneumothorax." **Journal of Tropical Medicine and Hygiene, 63** (3), 67–70.

639—KARANDIKAR, G. K., SALUNKE, D. S., PATEL, M. V. & LUHAR, P. M., 1959. [Seth U.P.A.R. Unit, Department of Pharmacology, Medical College, Baroda, India.] "Anthelmintic use of hydrogen peroxide. A preliminary report." **Indian Journal of Medical Sciences, 13** (2), 95–98.

12 cases of hookworm infection were treated with 1% hydrogen peroxide given by stomach tube. Adults received 300 ml. and children half this quantity. Twenty-four-hour stool samples were collected on the day before treatment and on at least four occasions during 15 days after treatment. Hookworms were passed by all cases on the day of treatment. In most cases egg counts were reduced after treatment. One child vomited after receiving the dose.

J. E. D. Keeling

*640—KRŠNJAVI, B., 1957. "Prilog poznavanju raširenosti humane trihineloze u Jugoslaviji. Prethodno saopćenje." [Incidence of human trichinelliasis in Yugoslavia; preliminary report.] **Higijena. Belgrade, 9** (1), 40–46.

641—KUIPERS, F. C., THIEL, P. H. VAN & ROSKAM, E. T., 1960. "Eosinofiele flegmone van de dunne darm, veroorzaakt door een niet aan het lichaam van de mens aangepaste worm." **Nederlands Tijdschrift voor Geneeskunde, 104** (9), 422–427. [English summary p. 427.]

This is a report from the pathological and histological points of view on the specimens of ileum resected from 11 patients. There was a definite eosinophilic inflammatory condition affecting the whole thickness of the intestine, the mucosa showed an ulcer in the centre of which was the larva of a worm, *Anacanthocheilus rotundatus*, a parasite of the herring. The patients had apparently all eaten insufficiently cured herrings. W. K. Dunscombe

642—LEIKINA, E. S. ET AL., 1959. [Sektor eksperimentalnoi parazitologii, Institut malyarii, meditsinskoi parazitologii i gelmintologii, Ministerstvo zdravookhraneniya SSSR.] [The characteristics of the epidemiology of ancylostomiasis in two settlements in the Lenkoran area.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 28** (4), 387–394. [In Russian.]

Ancylostomiasis (predominantly *Necator* infections) was frequent both in a lowland and a foothill settlement in the Lenkoran area of Azerbaidzhan. The limit of infection therefore lies beyond the foothills and not as previously assumed. In the lowlands almost every farm was a microfocus of infection while in the foothills only occasional farms were affected. The distribution of infection depends basically on the topography of the district and the lack of hygiene among the population. The principal carriers were persons aged from 9 to 25–40 years.

G. I. Pozniak

643—LEVENSON, E. D., 1960.—[Institut meditsinskoi parazitologii i tropicheskoi meditsini imeni Martsinovskogo, Ministerstvo zdravookhraneniya SSSR, Moscow.] [Mass treatment with piperazine in a focus of human ascariasis.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (2), 139–143. [In Russian: English summary pp. 142–143.]

The 250 inhabitants of a collective farm with very inadequate sanitary facilities and hyperendemic ascariasis, were repeatedly treated in the course of three years with piperazine and were instructed in hygiene and induced to build family latrines. Although the cure rate was high, reinfections, due to the continued contamination of the soil by children, amounted to 54·7% in the first year and 23·8% to 25·9% in the two following years and involved chiefly children. Emphasis is laid on the importance of clearing infection from microfoci, i.e. families, in order to effect control of such a focus.

G. I. Pozniak

644—LIMA, J. P. & ROITHMAN, N., 1959. [Faculdade de Medicina de Pôrto Alegre, Brazil.] "Estrongiloidíase. Considerações clínico-laboratoriais e radiológicas." **Hospital. Rio de Janeiro, 56** (3), 461–487. [English summary pp. 485–486.]

Out of 190 hospital patients in the State of Rio Grande do Sul (Brazil) 113 had intestinal helminths and 62 of these were *Strongyloides* infections. Many were completely asymptomatic but a number had hyperchlorhydria (Ewald's test meal). After barium meals non-specific changes in motility of the intestine were found frequently. Eosinophilia was not prominent. Treatment by Lugol's iodine and/or oxytetracycline was completely unsuccessful, but five patients were cured by gentian violet orally or by duodenal intubation. W. K. Dunscombe

*645—MARIA, B. DE & ROSSI-ESPAGNET, A., 1957. "Considerazioni su alcuni aspetti relativi alla patogenesi dell'anaemia da *Ancylostoma duodenale*." **Rassegna di Fisiopatologia Clinica e Terapeutica, 29** (9), 923–938.

646—MAZZOTTI, L., 1959. [Instituto de Salubridad y Enfermedades Tropicales, México, D.F., Mexico.] "Presencia de microfilarias de *Onchocerca volvulus* en el líquido cefalorraquídeo de enfermos tratados con hetrazan." **Revista del Instituto de Salubridad y Enfermedades Tropicales. Mexico, 19** (1), 1–5. [English summary p. 4.]

Onchocerciasis is the only human filariasis in the endemic regions of Mexico. In five cases microfilariae were recovered after lumbar puncture one to three days after beginning hetrazan treatment. Samples of blood (20 c.c.) taken at the same time were all positive, but only two-fifths were when samples were taken two to five days after treatment. Both spinal fluid and blood were negative ten days or more after the end of treatment. W. K. Dunscombe

647—MAZZOTTI, L., 1959. [Instituto de Salubridad y Enfermedades Tropicales, México, D.F., Mexico.] "Nuevas posibilidades para la aplicación de tratamiento antihelmínticos en masa." **Revista del Instituto de Salubridad y Enfermedades Tropicales. Mexico, 19** (2), 135–140. [English summary p. 139.]

648—MAZZOTTI, L., GAXIOLA, V. & DESCHAMPS, J., 1959. [Instituto de Salubridad y Enfermedades Tropicales, México, D.F., Mexico.] "Posibilidad de radiográfiar las excavaciones óseas producidas por los nódulos de *Onchocerca volvulus*." **Revista del Instituto de Salubridad y Enfermedades Tropicales. Mexico, 19** (1), 15–17. [English summary p. 17.]

649—MUAZZAM, M. G., KHALEQUE, K. A. & IBRAHIM, M., 1960. [Dacca Medical College, East Pakistan.] "Hepatic ascariasis." **Journal of Tropical Medicine and Hygiene, 63** (4), 95–97.

650—NOGUEIRA, C. E. D., 1958. [Faculdade de Medicina, Universidade de Minais Gerais, Brazil.] "Ascaridiose das vias biliferas. (Com apresentação de um caso)." **Hospital. Rio de Janeiro, 54** (1), 83–91. [English & French summaries p. 91.]

651—OGAWA, H., 1959. [Department of Parasitology, National Institute of Health, Tokyo, Japan.] [Studies on enterobiasis. 2. Observations on pinworm infection among families.] **Japanese Journal of Parasitology, 8** (6), 958–961. [In Japanese: English summary p. 961.]

652—OGAWA, H., 1960. [Department of Parasitology, National Institute of Health, Tokyo, Japan.] [Studies on enterobiasis. 3. Trial for the short therapeutic regime of piperazine against enterobiasis and pinworm reinfection among cured children.] **Japanese Journal of Parasitology, 9** (1), 117–124. [In Japanese: English summary p. 124.]

For short term treatment by piperazine derivatives against pinworms, 100 mg. per kg. body-weight of piperazine hydrate for two days was proved to be most effective. Schoolchildren who became negative after piperazine treatment were re-examined eighty days later. The reinfection rate was 43·8%. It is concluded that for successful eradication of pinworms mass treatment of children at school is not enough, and that members of the family should be treated at the same time. Y. Yamao

653—PETTER, C., 1960. "Etude zoologique de la larva migrans." **Annales de Parasitologie Humaine et Comparée, 35** (1/2), 118–137.

Petter discusses the biology of various ascarids and considers the possibility of transmission to man in the light of the ecology of their definititive hosts. The author then quotes some clinical data pertaining to the visceral larva migrans syndrome. He concludes that man could be accidentally infected with certain ascarids from wild animals as well as the ascarids from dogs and cats. N. Jones

654—POKROVSKI, S. N., 1960. [Institut malyarii i meditsinskoi parazitologii, Ministerstvo zdravookhraneniya RSFSR.] [The possibility of using sea-water in the control of ancylostomiasis.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (2), 235. [In Russian.]

Laboratory experiments confirmed that *Necator* eggs when placed in sea-water ceased development and, similarly, that sea-water was lethal to trichostrongylid eggs and to *Strongylus* larvae

in horse dung. It is therefore suggested that sea-water could be used in the control of ancylostomiasis in coastal districts, by watering yards and paths around toilets and areas contaminated by human faeces with it. G. I. Pozniak

*655—POPMIKHAILOV, D., 1957. [Roentgenographic symptoms and method of examination in ascariasis.] **Suvremenna Meditsina. Sofia, 8** (6), 36–46. [In Bulgarian.]

656—PRUDSKAYA, L. E., 1959. [Uzhgorod nauchno-issledovatelski institut epidemiologii, mikrobiologii i gigieni, U.S.S.R.] [Trichinelliasis in the Transcarpathian region.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 28** (4), 413–415. [In Russian: English summary p. 415.]

Ten outbreaks of trichinelliasis involving 67 persons were observed during 1946–56 in the Transcarpathian area. Eight of these occurred on mountain farms situated in the vicinity of forests. The infections were contracted through the consumption of smoked meat from privately slaughtered pigs. G. I. Pozniak

657—PURINA, E. A., 1957. [Sanitary education at a scout camp in prevention of ascariasis in children.] **Higiena i Sanitariya. Moscow, 22** (4), 86–87. [In Russian.]

*658—PYZIOŁ, A., 1957. "Rola owsików w zapaleniu wyrostka robaczkowego." [Role of *Oxyuris vermicularis* in appendicitis.] **Patologia Polska, 8** (1), 73–80.

659—RODENBURG, W. & WIELINGA, W. J., 1960. "Eosinofiele flegmone van de dunne darm, veroorzaakt door een worm." **Nederlands Tijdschrift voor Geneeskunde, 104** (9), 417–421. [English summary p. 421.]

Between 1955 and 1959 in Rotterdam 11 patients whose clinical picture suggested intestinal obstruction were operated on with resection of part of the ileum; two died (from staphylococcal enteritis). One patient had *Ascaris* ova in the stool. The condition seemed to be allergic in nature due to a helminth [see also abstract No. 641 above]. W. K. Dunscombe

660—ROSENBERG, A. I., 1960. [Sektor gigieni pochvi, Ukrainski nauchno-issledovatelski institut kommunalnoi gigieni.] [Sanitary and hygienic measures for the control of focal ascariasis.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (2), 143–149. [In Russian: English summary p. 149.]

Before undertaking sanitary and hygienic measures against ascariasis in a village of about 1,600 inhabitants the incidence of ascarid eggs was 100% in 40 soil samples and 71·43% in 28 fruit samples. 41% of eggs found in the soil and 19% of those found on the fruit were viable. Abandoning the use of untreated human faeces as manure and improving general hygiene, reduced the incidence of eggs to 35% and 25% in the soil and on the fruit respectively; these eggs were not viable. N. Jones

661—SAJEWICZ, J., 1960. [Bielsk Podlaski, ul. Kazimierzowska 30, Poland.] "Problem pasożytów jelitowych u ludności północno-wschodnich rejonów Polski." **Wiadomości Parazytologiczne, 6** (1), 71–75. [English summary p. 75.]

In 1958 Sajewicz examined 1,057 persons for intestinal parasites in the Bielsk Podlaski District which is characteristic of conditions in north-eastern Poland. The incidence of helminths was: *Trichuris trichiura* 40·3%; *Ascaris lumbricoides* 21·4%; *Enterobius vermicularis* 1%. 52·8% of the infected persons were females. Mixed infections were observed in 151 persons, the most frequent being ascariasis and trichuriasis (103 persons). Data on the incidence of parasites according to locality, age and profession are given in tables. N. Jones

662—SASA, M. ET AL., 1959. [Department of Parasitology, Institute for Infectious Diseases, University of Tokyo, Tokyo, Japan.] [Studies on the control of bancroftian filariasis in Ehime.] **Japanese Journal of Parasitology, 8** (6), 880–885. [In Japanese: English summary p. 885.]

Field studies on the control of bancroftian filariasis endemic in two villages in Misakicho, Ehime Prefecture, were preceded by mass treatment of microfilarial carriers with supatonin

(diethylcarbamazine) and control of the vector mosquito by residual spraying with dieldrin. Supatonin was administered to the microfilaria carriers in a dose of 2 mg. per kg. body-weight once a day for five days, then 4 mg. per kg. per day for five days, with a total of 30 mg. per kg. in a period of 10 days. The microfilarial count of the carriers in 60 cu. mm. of blood before the treatment ranged from 176 to one, with an average of 27. After administration of the drug, 10 of 30 carriers became negative and the microfilarial count dropped from 21 to nil, the average being 3·43. A residual spraying of dieldrin in homes was carried out at the beginning of August, applying 40 c.c. of 0·25% emulsion for every square metre of wall. Remarkable reductions of mosquitoes and flies were seen immediately after the spraying. Mosquito collections with traps gave negative results all through the summer. However, the house-fly population estimated by fly-papers increased after about one month and after four months was about four times more than it used to be. Y. Yamao

663—SHAH, B. N. & MODI, C. J., 1959. [Research Laboratory, Sheth Vadilal Sarabhai General Hospital, Ahmedabad, India.] "Piperazine-tetracycline combination therapy of threadworm infestation." **Indian Journal of Medical Science, 13** (2), 99–104.

28 cases of enterobiasis, diagnosed by examination of sellotape swabs, received piperazine citrate syrup at a dose level of 75 mg. per kg. body-weight daily, given as two doses each day. In addition a tetracycline phosphate preparation containing Nystatin was given at a dose level of 22 mg. per kg. daily, the total daily dose being divided into three or four smaller doses. The treatment occupied seven consecutive days. No special hygienic precautions were observed. Swabs examined on the 8th, 15th, 22nd and 60th days after commencement of treatment showed cure rates of 100%, 95%, 81% and 46% respectively. The authors conclude that the relatively expensive combination of piperazine and tetracycline is not superior in anthelmintic activity to piperazine alone. J. E. D. Keeling

664—SOKOLINSKI, I. R., 1959. [Combined treatment of trichuriasis in children with oxygen and diathermy.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 28** (4), 438–439. [In Russian: English summary p. 439.]

About 100 ml. of oxygen per year of age were administered by tube per rectum to children with trichuriasis on three successive days after a preliminary careful cleansing of the intestine. This was followed by diathermic treatment of the right iliac region for 30 minutes each day for 15 days, and a laxative on the eighth and fifteenth days. 21 of 22 children were cured and no side effects were observed. G. I. Pozniak

665—TURCHINS, M. E. & BABAEVA, O. M., 1959. [Klinicheski otdel, Institut malyarii, meditsinskoi parazitologii i gelmintologii, Ministerstvo zdravookhraneniya SSSR.] [Treatment of enterobiasis with piperazine phosphate.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 28** (4), 434–436. [In Russian.]

Six adults and 53 children with enterobiasis were treated with piperazine phosphate in doses of 0·4 gm. to 2·0 gm. according to age for children one to fourteen years old, and 2 gm. to 3 gm. for persons aged 15 years and over. This daily dose was given in two to three parts on five consecutive days. The results were judged principally on anal swab examinations. The efficacy achieved (90%) was much higher than that obtained with piperazine hexahydrate, adipate and sulphate in earlier experiments. G. I. Pozniak

666—UOZUMI, K., 1959. [Department of Radiology, Faculty of Medicine, Kyushu University, Fukuoka, Japan.] [An experimental study of X-ray therapy for gnathostomiasis.] **Igaku Kenkyu. Fukuoka, 29** (7), 2050–2070. [In Japanese: English summary p. 2070.]

Uozumi experimentally examined the resistance of third-stage larvae of *Gnathostoma spinigerum* to X-rays in the hope of devising an X-ray therapy for gnathostomiasis. He concluded that X-irradiation could hardly be expected to serve as an effective cure for human gnathostomiasis, because the larvae were rendered non-viable and non-infective only when high intensity X-irradiation was employed. Y. Yamao

667—VAJRASTHIRA, S. & HARINASUTA, C., 1960. [Communicable Diseases Control Division, Department of Health, Ministry of Public Health, Thailand.] "The incidence of enterobiasis among children at five schools and two hospitals in Bangkok." **Annals of Tropical Medicine and Parasitology, 54** (2), 129–131.

Vajrasthira & Harinasuta examined 1,708 children, three to twelve years old, from five schools and two hospitals (out-patients) in Bangkok for enterobiasis. The total incidence was 53·6%, 51·9% among boys and 55·5% among girls. 222 infants aged from one month to two years were also examined and the incidence was 7·2%. Clinical studies of enterobiasis in 84 children revealed the presence of symptoms such as diarrhoea, abdominal pain, anorexia and weakness in less than 20%. N. Jones

668—VOLOSYUK, V. P., 1960. [Ukrainski institut epidemiologii i mikrobiologii.] [The epidemiology of ascariasis in the Ukrainian S.S.R.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (2), 132–139. [In Russian: English summary pp. 138–139.]

Volosyuk reviews epidemiological data on ascariasis from the literature and his own studies and concludes that the basic factor in the epidemiology in the Ukrainian S.S.R. is human and not the climato-botanical zones. The use of untreated human faeces as fertilizer, the creation of microclimatics by cultivating plants which give a lot of shade (e.g. strawberries) and the consumption of unwashed fruit provide suitable conditions for the survival and spread of the ova which would perish in the normal environment. N. Jones

669—VOLOSYUK, V. P., 1960. [Means of controlling ascariasis (a discussion).] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (2), 186–190. [In Russian.]

670—WU, C. C., 1959. [Sanitary Station, Hupeh Province, China.] [A report on filariasis and its mosquito vectors in Wuchang, Hupeh Province.] **Acta Microbiologica Sinica, 7** (1/2), 16–24. [In Chinese: English summary p. 24.]

1,074 persons were examined for filariasis on two farm co-operatives near Wuchang, each consisting of 11 villages. The infection rate, including cases of lymphangitis and elephantiasis was 34·18% and 49%. All microfilariae were of the *malayi* type. The youngest patient with microfilariae was two years old and the oldest 81 years. There was no significant correlation between incidence of filariasis and age or sex of patients. Four common species of mosquitoes were found in houses and cow-sheds, namely, *Anopheles hyrcanus* var. *sinensis*, *Culex fatigans*, *C. tritaeniorhynchus* and *Armigeres obturbans*. Dissection of 528 wild mosquitoes of the four species showed *A. hyrcanus* var. *sinensis* to be the only one with infective larvae, although the first three species mentioned harboured first-stage larvae. *A. hyrcanus* is believed to be the only vector in the district. Based on meteorological data, seasonal prevalence and the seasonal distribution of infective larvae in *A. hyrcanus*, the author believes that the main transmission period is June to August. L. S. Yeh

671—YAJIMA, F., 1960. [Department of Public Health, School of Medicine, Chiba University, Chiba, Japan.] [Studies on hookworm carriers in view of public health. 4. On the estimation of actual number of hookworms harboured by counting eggs in faeces.] **Japanese Journal of Parasitology, 9** (3), 281–289. [In Japanese: English summary p. 289.]

Yajima attempted to clarify the relationship between the number of eggs in the faeces and that of hookworms in the host. She is of the opinion that the relationship was similar to that in *Drosophila* reported by Pearl & Parker (1922) and concludes that the number of hookworms in the host cannot be easily estimated from the number of eggs in the faeces. Y. Yamao

672—YAMAGUCHI, T., NISHIMOTO, M., SAKAMOTO, Y., HIGASHIKAWA, H. & IRIE, T., 1958. [Department of Pathology, Tokushima University School of Medicine, Tokushima, Japan.] [On the distribution of hookworm in Susaki City, Kochi Prefecture.] **Shikoku Acta Medica, 12** (5), 786–790. [In Japanese: English summary p. 786.]

In order to determine the distribution of hookworm infection faecal examinations were carried out in Susaki City, Kochi Prefecture from 21st to 23rd February, 1958. Of 472 residents examined 50 (10·6%) were found to be positive. Treatment with tetrachlorethylene was successful in 26 out of 45 infected persons. Four (15·4%) were infected with *Ancylostoma duodenale*, 19 (73·1%) with *Necator americanus* and three (11·5%) with both species. Y. Yamao

673—YANAGIHARA, T., 1958. [Department of Pathology, Tokushima University School of Medicine, Tokushima, Japan.] [Endemic study on hookworm disease in eastern area of Shikoku.] **Shikoku Acta Medica, 13** (1), 50–70. [In Japanese: English summary pp. 50–51.]

Mass faecal examination and mass treatment for hookworm disease were carried out in the rural districts of the eastern area of Shikoku from September 1955. The infection rate was estimated to be at least 30% and was higher in females than in males. So far as age was concerned a higher incidence was observed in the 20 to 60-year-old age group. Tetrachlorethylene, at an average single dose of 4·5 gm. for an adult, was given to 1,294 persons, of whom 942 (72·8%) expelled adult worms in the faeces. Re-examination was carried out three to eight weeks after the first examination. 288 (62%) of 465 cases were found negative. Simple infection with *Ancylostoma duodenale* was seen in 708 cases (75·2%), *Necator americanus* in 98 cases (10·4%) and mixed infections in 136 cases (14·4%). In all 136 cases of mixed infection, the phenomenon of predominant parasitism was clearly observed. Y. Yamao

674—YOUNG, M. D., JEFFERY, G. M., FREED, J. E. & MOREHOUSE, W. G., 1958. [Department of Health Education and Welfare, National Institute of Allergy and Infective Diseases, Laboratory of Tropical Diseases, Beltsville, Maryland, U.S.A.] "Effectiveness of dithiazanine against worm infections of mental patients." **Archives of Neurology and Psychiatry. Chicago, 80** (6), 785–787.

Delvex (dithiazanine iodide), was administered to patients in a mental hospital at a dose level of 200 mg. four times daily for five days. Quantitative estimations of the intensity of helminthic infections were made by Stoll egg dilution counts carried out twice before therapy and on two samples collected during each of the first and third weeks after treatment. Of 23 cases infected with *Trichuris trichiura*, 61% were cured one week after treatment and at the three week examination 76% were free of eggs. The over-all reduction in total egg counts was 98·9%. None of the 27 cases of hookworm infection was cured and the over-all reduction in egg counts was only 39·6%. J. E. D. Keeling

675—ZDZIENICKI, S. & NOWOSIELSKI, T., 1960. [34 Wojskowe Centralne Laboratorium Sanitarno-Higieniczne, Warszawa, Poland.] "Jaja pasożytów przewodu pokarmowego na jarzynach z rynku warszawskiego." **Wiadomości Parazytologiczne, 6** (1), 67–69. [English summary p. 69.]

Lettuces and radishes obtained in the Warsaw market were heavily contaminated with *Ascaris*, *Enterobius* and *Trichuris* eggs. This comparatively high degree of contamination is explained by the frequent use of nightsoil for the manuring of fresh vegetable plots. G. I. Pozniak

Miscellaneous

676—AMARAL, A. D. F. ET AL., 1959. [Faculdade de Medicina Tropicale, Universidade de São Paulo, Brazil.] "Observações sôbre a atividade anti-helmíntica da ditiazanina." **Revista do Instituto de Medicina Tropical de São Paulo, 1** (1), 41–56. [English summary pp. 55–56.]

30 patients, 15 of whom were prisoners in São Paulo gaol, and 15 hospital outpatients most of whom were adults, all suffering from helminthiasis were treated by enteric-coated tablets of 100 mg. to 200 mg. dithiazanine t.i.d. for varying periods from 3 to 23 days, the total amounts ranging from 1·2 gm. to 13 gm., with the following results: (i) ten patients infected with *Schistosoma mansoni*, no effect; (ii) 20 patients infected with *Strongyloides stercoralis*, all cured; (iii) 17 patients with ancylostomiasis, one cured; (iv) 14 patients with *Trichuris*, 11 cured. Slight side effects occurred in most and consisted of nausea, vomiting, abdominal pain, and diarrhoea, especially at the commencement of treatment. To avoid this some patients were given a dose of chlorpromazine beforehand, which appeared to be beneficial.
W. K. Dunscombe

677—ARROYO, J., 1960. "Cuadro sinóptico de los parásitos en los sedimentos urinarios." **Medicina. Revista Mexicana, 40** (854), 473–477.

678—BAKER, S. J., RAJAN, K. T. & DEVADATTA, S., 1959. [Christian Medical College Hospital, Vellore, South India.] "Treatment of tropical eosinophilia. A controlled trial." **Lancet,** Year 1959, **2** (7095), 144–147.

A controlled trial in the treatment of tropical eosinophilia was carried out on 75 patients at Vellore, South India. They were divided into three groups, A, B and C, of 25 each and were

given tablets orally every day for one week and injections twice weekly for five weeks. Group A received placebo tablets and placebo injections; Group B received placebo tablets and Acetylarsan injections; Group C received diethylcarbamazine tablets and placebo injections. At the end of the five weeks' course of treatment the patients were kept under observation for at least two months, but in Group A, as there was no improvement after six weeks, the patients were then given active treatment. In Group B, 15 responded but seven of these relapsed later. Ten showed little or no improvement. In Group C, 24 of the 25 responded and more quickly than those treated with Acetylarsan. The effect of varying dosages with diethylcarbamazine on other patients was then investigated. No difference was found between treatment with 5 mg. per kg. body-weight for seven days and 10 mg. per kg. for the same period. 5 mg. per kg. for only three days gave a similar result but there was one relapse. Treatments with 3 mg. per kg. for seven days and three days respectively were only partly successful and of 30 patients treated with 1 mg. per kg. per day, 21 did not respond. It is concluded that diethylcarbamazine is more effective than Acetylarsan and that treatment with diethylcarbamazine at 5 mg. per kg. body-weight for three days is adequate for this disease as seen in South India.

J. J. C. Buckley

*679—CAVENAUGH, R. L., FREYTAG, R. E. & MELTZER, H. D., 1957. "Parasitic infections in food handlers." **Medical Bulletin of the U.S. Army, Europe, 14** (1), 20–21.

680—GELFAND, M. & BERNBERG, H., 1959. "Tropical eosinophilic syndrome. A clinical description of the disorder as seen in S. Rhodesia." **Central African Journal of Medicine, 5** (8), 405–411.

In 1957 the frequency of eosinophilia in a cross-section of African and European patients in Rhodesia was compared and the clinical features of cases with high eosinophilia without proved schistosomiasis recorded. Of 400 Africans 41 showed eosinophilia of 6% or more; of 400 Europeans (251 adults, 99 children under 16) 50 showed 6% or more. In view of the high helminth infection rate in Africans the results suggest that a condition exists in Europeans responsible for the eosinophilic syndrome in which the lungs are not necessarily affected. The authors suggest that the word "pulmonary" should be omitted from the name of this syndrome. Cortisone may be helpful in some cases of this condition.

W. K. Dunscombe

681—JIROVEC, O. & HAVLIK, O., 1960. [Československá Akademie Věd, Praha, Czechoslovakia.] "Parazytologia w Chińskiej Republice Ludowej." [Parasitology in the Chinese People's Republic.] **Wiadomości Parazytologiczne, 6** (1), 81–95.

682—KARASHIMA, S., ET AL., 1959. [Department of Pediatrics, Kurume University School of Medicine, Kurume, Japan.] [Survey of intestinal parasites of schoolchildren during six years 1950-55 in Kurume City.] **Journal of the Kurume Medical Association, 22** (11), 4064–4069. [In Japanese: English summary p. 4069.]

683—KOZAR, Z., 1960. [Zakład Parazytologii PAN, Warszawa, Poland.] "Refleksje po wizycie u bułgarskich parazityologów lekarskich." [Reflections after the visit to Bulgarian Parasitologists.] **Wiadomości Parazytologiczne, 6** (1), 41–52. [English summary p. 52.]

684—KOZAR, Z., 1960. [Zakład Parazytologii, Polska Akademia Nauk, Warszawa, Poland.] "W sprawie pojęcia antropozoonoz pasożytniczych i ich podziału." **Wiadomości Parazytologiczne, 6** (2/3), 169–172. [English summary p. 172.]

This is an answer by Kozar to Tarczyński's paper on parasitic anthropozoonoses [see abstract No. 692 below] in which Tarczyński discusses Kozar's definition and classification of this concept [for abstract see Helm. Abs. **29**, No. 980]. Kozar here upholds his earlier work and points out some of the advantages of his classification.

G. I. Pozniak

685—MISRA, S. M. & AGARWAL, R. L., 1957. [G. R. Medical College, Gwalior, India.] "Two cases of creeping disease." **Journal of the Indian Medical Association, 29** (3), 114–116.

686—PESSÔA, S. B., 1959. "Considerações sôbre as verminoses no Nordeste brasileiro." **Revista do Instituto de Medicina de São Paulo, 1** (1), 57–80. [English & French summaries pp. 76–77.]
Pessôa gives an extensive review of the position as regards helminthiasis in seven states of north-east Brazil. Infection is higher in the humid lower-lying areas than in the semi-arid inland regions. Emphasis is laid especially on the high infection rate in very young children, more particularly as regards *Ascaris* (a child only six weeks old was found infected), ancylostomiasis (in some areas 36% of all children under two years old were positive), and schistosomiasis mansoni, where the acute symptoms may be mistaken for other acute conditions. Mention is made of the value of the calculation of the number of ancylostome ova per gramme of faeces in epidemiological surveys. The very poor hygienic conditions are blamed for the high incidence (*Ascaris* eggs carried by the wind were found on slides covered with cedar oil exposed at the laboratory at Aracaju) and on the general dietary deficiencies. The problem of helminthiasis in this very large area is less a medical than a socio-economic one. W. K. Dunscombe

687—RICCI, M. & CRESTA, M., 1960. [Instituto Superiore di Sanità, Laboratorio di Parassitologia, Roma, Italy.] "Ricerche sull'accrescimento infantile, in relazione al parassitismo intestinale, nel Comune di Rofrano (Salerno)." **Rivista di Parassitologia, 21** (3), 199–216. [English summary pp. 215–216.]
Examination of all the pupils in an elementary school in Rofrano (a commune with all the characteristics of an under-developed area), revealed that 97·65% of 340 children harboured from one to seven intestinal parasite species. Among these were *Hymenolepis nana*, *Ascaris lumbricoides*, *Enterobius vermicularis*, *Trichuris trichiura* and *Taenia solium*. The difference between the normal weight gains and those of parasitized children increased with the number of parasites. This was even more apparent in the case of pathogenic parasites. The difference in stature was not so obvious. In three experimental treatments of 100 children, Acranil, dithiazanine and piperazine adipate were used. Another group of 100 children served as controls. When the results were compared at the end of the experiment, which lasted one year, it was apparent that weight gains were greater in the treated children. N. Jones

688—ROBLEDO, E., SANTIBÁÑEZ, E., GONZÁLEZ, C. & BIAGI, F., 1960. [Sección de Parasitología, Unidad de Patología, Escuela de Medicina, U.N.A.M., Hospital General, México 7, D.F., Mexico.] "Los purgantes en el diagnóstico de las parasitosis intestinales." **Revista Latino-americana de Microbiología. Mexico, 3** (2), 75–80. [English summary p. 80.]
Three faecal samples from 377 children were obtained without a purgative and a fourth with a purgative. *Ascaris lumbricoides*, *Trichuris trichiura*, *Enterobius vermicularis*, hookworms, *Hymenolepis nana*, *Taenia* sp. and *Strongyloides stercoralis* were found. It was found that the number of negative results increased with the use of purgatives. N. Jones

689—SAIF, M., 1959. [Institute of Research for Tropical Medicine, Cairo.] "The haemoglobin level in parasitic diseases." **Journal of the Egyptian Medical Association, 42** (10), 578–582.
Saif compared the haemoglobin levels in 972 parasite-free individuals and 3,242 persons with a single or mixed helminth infection. The infections were: 373 with *Ancylostoma duodenale*; 530 with *Ascaris*; 222 with a cestode (*Taenia* or *Hymenolepis*); 67 with *Schistosoma mansoni*; 667 with *S. haematobium*; 111 with *Trichostrongylus*; and 202 with *Enterobius*. 530 had both *A. duodenale* and another helminth infection. The haemaglobin levels ranged from 20% to 100% but were always lowest when there was an associated *A. duodenale* or *S. mansoni* infection; these patients also showed the largest coefficient of variation. W. K. Dunscombe

690—SHPIL'KO, N. V., 1959. [Krasnoselkupskaya raionnaya bolnitsa, Yamalo-Nenetski natsionalnii okrug, U.S.S.R.] [The helminth fauna of the population of the Taz river basin.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 28** (4), 418–421. [In Russian: English summary p. 421.]
Of 1,614 persons living along the Taz river in Russia, 91·5% were infected with *Diphyllobothrium*, 1·5% with *Hymenolepis*, 3·5% with *Opisthorchis*, 2·1% with *Ascaris* and 1·4% with *Taenia*. The first two infections were common to both the original inhabitants and recent settlers, the *Opisthorchis* and *Ascaris* were restricted to recent settlers and *Taenia* was found in old inhabitants only. G. I. Pozniak

691—SHULMAN, E. S., 1959. [Kafedra epidemiologii i meditsinskoi parazitologii, Ukrainski institut usovershenstvovaniya vrachei, Kharkov.] [The geography of epidemic areas of helminthiases in the Ukraine.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 28** (4), 405–410. [In Russian.]

Twenty species of helminths are known from man in the Ukraine, and their epidemiology and geographical distribution are recounted. The most wide-spread are *Ascaris lumbricoides*, *Trichuris trichiura*, *Enterobius vermicularis*, *Hymenolepis nana*, *Taenia saginata*, *T. solium* and *Opisthorchis*. *Ascaris* and *Trichuris* infections are discussed in greater detail. For the other 13 species only occasional cases or foci have been reported. G. I. Pozniak

692—TARCZYŃSKI, S., 1960. [Katedra Parazytologii i Chorób Inwazyjnych, Wydział Weterynarii, S.G.G.W., Warszawa, Poland.] "Antropozoonozy pasożytnicze jako wyraz jedności świata zwierzęcego z człowiekiem." **Wiadomości Parazytologiczne, 6** (2/3), 157–168. [English summary p. 168.]

Tarczyński defines an anthropozoonosis as an infection in which the parasite is transferred from animal to man, who can be its definitive, supplementary, intermediate or parallel host. Then he discusses the point of view of Kozar [for abstract see Helm. Abs., **29**, No. 980], pointing out that since the specificity of parasites varies, and depends on ecological, physiological, evolutionary and other factors, the only basis for determining an anthropozoonosis can be the aetiological and, subsequently, the epidemiological factor. Only at this point can the division of anthropozoonoses into absolute and relative be made. The former are defined by the author as those in which man is an obligatory host, the latter as those in which the presence of man in the life-cycle is optional. The author goes on to discuss the evolution of parasites alongside that of their hosts and their mutual interdependence. He stresses the importance of the focus problem in the case of many parasitic anthropozoonoses. N. Jones

693—TAY ZABALA, J. & NAVARRETE, F., 1960. [Sección de Parasitología, Unidad de Patología, Escuela de Medicina, U.N.A.M. Hospital General, México 7, D.F.] "Frecuencia de parasitosis intestinales en Ometepec, Estado de Guerrero, México." **Medicina. Revista Mexicana, 40** (843), 200–203.

Faecal examination of 651 persons ranging from less than one to thirty years of age was carried out in Ometepec (Guerrero, Mexico). One to four examinations were carried out on each individual and the number of intestinal parasite species present was found to range from one to seven. Multiple infections were most frequent among the children of school age. Over-all incidence of infection was 99·5%. The prevalence of particular helminths, as seen by three or more examinations of 372 inhabitants, was: *Hymenolepis nana* 8·3%, *H. diminuta* 0·5%, *Ascaris lumbricoides* 90%, hookworms 63·1%, *Strongyloides stercoralis* 8·3%, *Enterobius vermicularis* 1·6% and *Trichuris trichiura* 85·2%. N. Jones

694—TURCHINS, M. E. & SEMENOVA, N. E., 1958. [Klinicheski sektor, Institut malyarii, meditsinskoi parasitologii i gelmintologii, Ministerstvo zdravookhraneniya SSSR.] [Result of treatment of *Hymenolepis* infection with decreased doses of ether extract of filicis maris.] **Sovetskaya Meditsina, 22** (1), 123. [In Russian.]

Hymenolepis infection was treated in 63 adults and children with ether extract of male fern. Three daily doses of 0·2 gm. to 1·5 gm. were given at intervals of 10 to 12 days. Many *H. nana* were passed, usually with scoleces. *Enterobius* were also eliminated, occasionally in large numbers. No side effects were observed. N. Jones

695—ZWIERZ, C. ET AL., 1960. [Wojewódzka Stacja Sanitarno-Epidemiologiczna i Wojewódzka Przychodnia, Zielona Góra, Poland.] "Współistnienie *Shigella* i robaczyc przewodu pokarmowego wśród mieszkańców Zielonej Góry." **Wiadomości Parazytologiczne, 6** (2/3), 197–201. [English summary p. 201.]

Zwierz *et al.* carried out helminthological and bacteriological examinations of 2,434 persons. Dysentery was diagnosed in 85 of these persons and at the same time 65·8% of this group had intestinal helminthiasis, which was less frequent in other groups (44·1%). Infections were: *Enterobius vermicularis* in 39, *Taenia* sp. in 14, *Trichuris trichiura* in four and *Ascaris lumbricoides* in one person. Mixed infections were observed in 11 cases. In another group of

323 persons with the incidence of dysentery higher than in other groups (5·9%), the incidence of helminthiasis was 59·1%. Not all persons of this group who had dysentery harboured helminths at the same time. N. Jones

VETERINARY HELMINTHOLOGY

Horses, Donkeys and Mules

696—CASE, A. A., 1957. [University of Missouri, Columbia, Missouri, U.S.A.] "The invasion and destruction of subserosal tissues in the horse by migrating stages of *Strongylus edentatus*." **Transactions of the Kansas Academy of Science, 60** (3), 297–300.

A case is reported of a heavy prepatent *Strongylus edentatus* infection in a yearling pony in Missouri. The pony died from the effects of the lodging in the oesophagus of a bolus, given in an effort to relieve digestive disturbance which accompanied the infection. The extensive destruction of the subperitoneal tissue is illustrated. Several worms were observed in copula in the haematomata. G. I. Pozniak

697—CLARK, D. T. & CONNOR, N. D., 1959. [Department of Microbiology, Michigan State University, East Lansing, Michigan, U.S.A.] "Field tests on the efficacy of piperazine-carbon disulfide complex in the treatment of foals for gastrointestinal parasites." **American Journal of Veterinary Research, 20** (76), 452–458.

Parvex suspension (containing 250 mg. per c.c. of betaine 1-piperazine carbodithioic acid) was administered to three groups of 14 foals at dose levels of 150 mg., 100 mg. and 75 mg. per kg. body-weight and to five foals at 50 mg. per kg. Anthelmintic efficiency was assessed by direct counts of nematodes passed in faeces and by comparison of two pre-treatment faecal egg counts with two post-treatment counts. The first post-treatment count was performed one week after treatment and the second count three weeks later. All dose levels removed *Parascaris equorum* infections completely and considerably reduced the counts of strongyle eggs. At 50 mg. per kg. the strongyle egg count had returned to a moderately high level at the second post-treatment examination. The treatment also removed oxyurids. Foals treated with carbon disulphide after treatment with Parvex suspension did not pass significant numbers of parasites. Parvex suspension given after carbon disulphide removed a further number of ascarids and oxyurids. The treatment was well tolerated. J. E. D. Keeling

698—FUKUI, M., 1960. [Department of Parasitology, Institute for Infectious Diseases, University of Tokyo, Tokyo, Japan.] [Studies on equine tapeworms and their intermediate hosts. 1. Studies on the incidence of equine tapeworms, *Anoplocephala perfoliata* Goeze 1782 and *Anoplocephala magna* Abildgaard 1789 and experimental studies on the removal of these cestodes with bithionol.] **Japanese Journal of Parasitology, 9** (2), 190–194. [In Japanese: English summary p. 194.]

During the summer and autumn of 1958, equine tapeworm diseases due to *Anoplocephala perfoliata* and *A. magna* were surveyed in several ranches in the suburbs of Tokyo. Young Thoroughbreds were heavily infected (46·3%) with *A. perfoliata*, but adult horses were free from this infection except in four cases (6·6%). *A. magna* was found in only three horses at one ranch. Bithionol (2, 2′-dihydroxy-3, 3′, 5, 5′-tetrachloro-diphenylsulphide) in a single dose of 10 mg. per kg. body-weight, was found to be satisfactory for removing these tapeworms without any serious side effects. Y. Yamao

699—FUKUI, M., KANEKO, C. & OGAWA, A., 1960. [Department of Parasitology, Institute for Infectious Diseases, University of Tokyo, Tokyo, Japan.] [Studies on equine tapeworms and their intermediate hosts. 2. Studies on removal effects of bithionol, bithionol acetate and dichlorophen for equine tapeworm, *Anoplocephala perfoliata*.] **Japanese Journal of Parasitology, 9** (3), 217–223. [In Japanese: English summary p. 223.]

Three new taeniacides, bithionol, bithionol acetate and dichlorophen, were tested against *Anoplocephala perfoliata*. Bithionol and bithionol acetate were shown to be effective in eradicating anoplocephalids at a dose of over 7 mg. to 10 mg. per kg. body-weight respectively; dichlorophen was proved to be effective at a dosage of over 25 mg. per kg. The worms were actually expelled 36 hours after administration. All these chemicals showed only a negligible toxicity to horses. Y. Yamao

700—JACKSON, R. S., 1958. "Cadmium oxide therapy in equine ascariasis." **M.S.U. Veterinarian. Michigan State University, 18** (2), 99–100.
Jackson treated fifteen weanling colts with Aska-Rid, a powder containing 1·5% cadmium oxide. Each animal received 15 gm. of powder in feed for three consecutive days. The faeces of fourteen of the treated animals were negative for the eggs of *Parascaris equorum* after three days. In the other treated animal the numbers of eggs were reduced. Throughout this period the faeces of untreated colts contained moderate numbers of eggs. J. E. D. Keeling

701—KHOMYAKOV, A. M., MENDELEVICH, M. M. & GONIN, S. L., 1957. [Anthelmintic treatment as a factor in stimulating immunogenesis in horses producing antitoxic sera.] **Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, 28** (1), 110–114. [In Russian.]
Treatment with oxygen and sodium fluoride against intestinal helminths in four horses used as donors of anti-tetanus serum has shown that the presence of parascarids interferes with the amount and quality of antiserum produced. The average haemoglobin content of the donor blood was 63·2% and 42·2% in the first and third bleedings before treatment and 71% and 53% respectively, after treatment. The antibody titres also showed an increase.
G. I. Pozniak

702—KRALJ, M. ET AL., 1960. [Institut za zarazne i invazione bolesti i Institut za patologiju i terapiju Veterinarskog fakulteta, Sveučilište u Zagrebu, Yugoslavia.] "Akutna fascioloza konja s posebnim osvrtom na diferencijalnu dijagnozu zarazne anemije." **Veterinarski Arhiv, 30** (7/8), 192–199. [English & French summaries pp. 198–199.]
Kralj *et al.* observed acute fascioliasis in nine adult horses and one foal. The disease lasted approximately 14 to 21 days in six horses and about two months in another two horses. Faecal examinations revealed the presence of strongyle eggs in all and ascarid eggs in most, but *Fasciola hepatica* eggs were found in only one. Diagnosis during life was accurately made by liver biopsy. A detailed, illustrated description is given of the clinical, haematological and histological aspects of the disease. N. Jones

703—PANDE, B. P. & RAI, P., 1960. [Department of Parasitology, U.P. College of Veterinary Science and Animal Husbandry, Mathura (U.P.), India.] "The nematode genus *Strongyloides* Grassi, 1879 in Indian livestock. I. Observations on natural infections in the donkey (*Equus asinus*)." **British Veterinary Journal, 116** (8), 281–283.
The authors report *Strongyloides westeri* Ihle, 1917 from the duodenum of *Equus asinus* in India. They state that this is the first record of this parasite from the donkey and that it is the first report of this genus from an equine host in India. The records are from two foals under the age of one year, one being nine months old. They give detailed pathological findings, illustrated by a photomicrograph of a section of affected duodenal mucosa, which indicate the occurrence of a subacute inflammation due to the presence of the parasites. The foals were somewhat emaciated. A brief review of literature on the systematics of *Strongyloides* and the pathogenesis of the genus in foals is included. W. M. Fitzsimmons

704—SCHEBITZ, H., 1960. [München, Königinstrasse 18, West Germany.] "Eine durch *Thelazia lacrimalis* beim Pferd verursachte Conjunctivitis ulcerosa." **Deutsche Tierärztliche Wochenschrift, 67** (20), 564–567. [English summary p. 567.]
The author describes a case of ulcerative conjunctivitis with granuloma formation caused by *Thelazia lacrimalis* in a horse in Cairo and records observations on some 56 donkeys. A very detailed account of symptoms, lesions, histology, diagnosis and treatment is given. The horse had a history of similar symptoms in the three previous years between May and August. An adult mature *T. lacrimalis* was found in conjunctival washings and larvae were demonstrated in the blood by the following concentration technique: 5 ml. of blood were added to 15 ml. of the following mixture: 5% formalin 55 ml., glacial acetic acid 5 ml., concentrated alcoholic gentian violet solution (4 gm. in 1,000 96% alcohol) 2 ml. This was then centrifuged and the stained larvae were found in the deposit. These larvae measured 140 μ to 170 μ in contrast to those of *Setaria equina* which measure 229 μ to 278 μ. A group of donkeys was kept under observation. Between May and August 60%, and in the remainder of the year 5%, showed conjunctival symptoms. In 22 out of 56 of those showing symptoms, larvae were demonstrated in the blood. W. M. Fitzsimmons

705—UGRIN, I. N. & SKOVRONSKI, R. V., 1959. [Fascioliasis in horses.] **Sbornik Nauchnikh Trudov. Lvovski Zooveterinarni Institut, 9,** 219–225. [In Russian.]
Ugrin & Skovronski report on an outbreak of fascioliasis among horses in the Lvov region. The horses were grazed together with cattle. Although the bile-duct contained up to 615 flukes and some were found in the duodenum at post-mortem examination of fatal cases, the livers were neither enlarged nor was there any cirrhosis. Faecal examination of 74 adult horses and 12 foals revealed the incidence of infection as about 25% among the former and 50% among the latter. Biochemical examination of the blood of infected animals showed low levels of inorganic and acid-soluble phosphorus. Carbon tetrachloride at doses of 6 ml. to 10 ml. for foals, and 10 ml. to 20 ml. for adults had a good therapeutic effect. The use of hexachlorethane (0·2 mg. per kg. body-weight) in the treatment of three horses failed to cure.
N. Jones

706—ŽEŠKOV, B., VUKELIĆ, E. & MAROLT, J., 1960. [Institut za patologiju i terapiju, Veterinarski fakultet, Sveučilište u Zagrebu, Yugoslavia.] "Rentgensko istraživanje onhocerkoze grebena u konja." **Veterinarski Arhiv, 30** (9/10), 247–251. [English & German summaries pp. 250–251.]
The withers of 470 clinically healthy horses aged from two months to 20 years were X-rayed for onchocerciasis. The following characteristic symptoms of the infection have been noted: (i) single and multiple calcifications in the soft tissue (in 45·3% of animals); (ii) osteolytic destructions in the spinous processes (in 3·8%); (iii) deposition of calcium salts in the lacunae formed by osteolysis and partial or complete repair of the lucunae; (iv) osseous metaplasis, mostly of polymorphous nature. 93·8% of these changes were localized in the region of the spinous processes of the first, second and third vertebrae.
N. Jones

Cattle

707—BAXTER, J. T., ALLAN, D. & PATTERSON, J. T., 1959. [Veterinary Research Division, Ministry of Agriculture, Northern Ireland.] "The influence of grazing 'immune cows' on the level of *Dictyocaulus viviparus* infection on pasture." **Journal of the British Grassland Society, 14** (4), 293–297.
Pasture which had been naturally infected with *Dictyocaulus viviparus* by grazing on it calves which were passing larvae, was divided into two portions. One was severely grazed by cows which were "immune" and were not shedding larvae, and the other was left unstocked. The number of larvae per lb. of herbage, the amount of herbage available and the total dry matter were recorded for each portion. The results show that grazing greatly reduced the larval numbers and, although it did not eliminate the larvae, a level of one larva per lb. of herbage was reached seven weeks earlier on the grazed than on the ungrazed area. There were no larvae on either area four months after the last infected faeces were voided.
K. R. Heath

708—EHRLICH, I., FORENBACHER, S., RIJAVEC, M. & KURELAC, B., 1960. [Institut za biologiju, Sveučilište u Zagrebu, Yugoslavia.] "Istraživanja o skutnoj metiljavosti. I. O nekim kliničkim i biokemijskim promjenama kod akutne metiljavosti goveda." **Veterinarski Arhiv, 30** (9/10), 229–236. [English & German summaries pp. 235–236.]
Ehrlich *et al.* have studied acute fascioliasis in 30 cattle, and describe its clinical, pathomorphological, haematological and biochemical aspects. The diagnosis was based on the findings of juvenile parasites, either in the punctate of the abdominal cavity or by biopsy of the liver. A diffuse acute, or sub-acute traumatic hepatitis was regularly observed. The most important changes were observed with regard to the concentration and relative distribution of serum protein fractions. The following data were noted: (i) albumins, 14·6% to 34%; (ii) globulins, an average of 75·9%; (iii) the quantity of bilirubin was slightly but constantly elevated (0·38 mg.% to 1·0 mg.%).
N. Jones

709—ENIGK, K. & DÜWEL, D., 1960. [Institut für Parasitologie und vet.-med. Zoologie der Tierärztlichen Hochschule, Hannover, West Germany.] "Die Behandlung der Fasciolose beim Rind mit 'Hetol'R." **Deutsche Tierärztliche Wochenschrift, 67** (19), 535–539. [English summary pp. 538–539.]

The efficiency of Hetol (1,4-Bis-trichloromethylbenzol) against liver-fluke was tested in 864 cattle. Treatment gave more satisfactory results in spring than in autumn indicating that the drug is effective only against adult flukes. In some cases the therapeutic dose (8 gm. per kg. body-weight) could be exceeded by one-and-a-half without danger in heifers. Tolerance was also good in lactating and pregnant cows and in stall-fed or pastured animals. However, transitory intolerance was observed in animals fed fresh beet leaves, beet and cabbage. No undesirable effects on milk yield or milk and meat flavour were noted. W. M. Fitzsimmons

710—FROYD, G. & ROUND, M. C., 1959. [Veterinary Research Laboratory, Kabete, Kenya.] "Infection of cattle with *Cysticercus bovis* by the injection of onchospheres." [Correspondence.] **Nature. London, 184** (4697), 1510.

Froyd, having found that adult cattle in Kenya were apparently resistant to artificial infection *per os* with eggs of *Taenia saginata*, the authors injected 24 adult cattle intravenously, subcutaneously and/or intramuscularly with hatched oncospheres. Cysts were subsequently found at the injection site in ten of the animals (four of which had already acquired natural infections). A full report on the experiments will be published later. R. T. Leiper

711—GOLDBERG, A. & LUCKER, J. T., 1960. [Animal Disease & Parasite Research Division, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Maryland, U.S.A.] "Effects on calves of gastrointestinal nematodes naturally acquired." **Proceedings of the Helminthological Society of Washington, 27** (2), 157–160.

The authors report two experiments designed to give information on the effect of helminth infection on the weight gain and general well-being of calves. Each experiment involved six calves reared worm-free and of similar ages, three of which were grazed on contaminated pasture and three on clean pasture, and lasted for 3·6 and 2·5 months, respectively. Faecal egg counts for the calves on the contaminated pastures rose to 1,200 and 947 e.p.g., respectively in the two experiments. The calves on the clean pastures remained worm-free, or practically so. One calf from the first group on contaminated pasture died of helminthiasis after 34 days, and yielded 67,987 helminths of mixed species. At necropsies of the other calves in these two groups, 34,302 to 95,220 helminths were collected. Average daily weight gains for the calves on clean pasture were respectively, 213% and 53·7% greater than that of the corresponding groups on contaminated pasture. J. H. S. Roberts

712—JORDAN, W. J., 1960. [Green Paddocks, Pulford, Nr. Chester, U.K.] "Treatment of fascioliasis." [Correspondence.] **Veterinary Record, 72** (38), 785.

Jordan reports anorexia, scouring, rapid loss of condition and, in one case, death in cattle in the Midlands dosed for fascioliasis with hexachlorethane. An intramuscular injection of equal parts of carbon tetrachloride and liquid paraffin at the rate of 12 c.c. to 15 c.c. in heifers weighing 6 to 7 cwt.; and of Carbaloma (sterile mixture of carbon tetrachloride with Diloma compound D and local anaesthetic) at the rate of 18 c.c. for heavily pregnant or recently calved cows brought about improved condition without side effects or local reaction.
W. M. Fitzsimmons

713—KOSTYRA, J., 1960. [Klinica Chirurgiczna, Wydział Weterynarii, Wyższa Szkoła Rolnicza, Lublin, Poland.] "Przebieg i leczenie telazjozy bydła." **Medycyna Weterynaryjna, 16** (10), 584–587. [English, French, German & Russian summaries p. 587.]

Kostyra observed conjunctivitis and keratitis, caused by *Thelazia rhodesii* infection in 82 cows. These parasites occurred throughout the year with the greatest intensity from mid-July to mid-October. The clinical picture depended on the intensity of infection, duration of the disease and on the season of the year. Small ecchymoses were observed on the mucous membrane under the third eyelid in the winter. Rinsing the conjunctival sac with 3% boric acid

or other antiseptics did not destroy the parasite. Subsequent treatments with antiseptics (3% boric acid solution and penicillin ointment) and instillations of 3% suspension of phenothiazine or D.D.T. in soya oil were ineffective. Finally, 3% aqueous piperazine adipate solution was instilled into the conjunctival sac followed three minutes later by a rinse with 3% boric acid solution. This solution of piperazine adipate caused *T. rhodesii* to cease movement within five to ten seconds *in vitro*. N. Jones

714—KUYKENDALL, LAWRENCE & LEE, 1957. "Chronic bloat due to parasites?" **Auburn Veterinarian. Alabama, 13** (2), 155–156.

715—McMANUS, D., 1960. [Veterinary Department, Uplands, Kenya.] "Prenatal infection of calves with *Cysticercus bovis*." **Veterinary Record, 72** (41), 847–848.

McManus adds to the existing evidence that pre-natal infection of calves with *Cysticercus bovis* is possible and emphasizes the need for meat inspection legislators to recognize this fact and emend regulations accordingly. Predilection sites in young calves are shoulder, tongue, heart and masseter muscles in that order of decreasing frequency and therefore inspectors' incisions into the masseters only are inadequate. From available knowledge, infections detected in calves over ten days old could have arisen post-natally whereas in younger animals they could only have arisen pre-natally. Detailed records from 51 cases are tabulated and divided into those of undoubted pre-natal origin (28 cases, age two to ten days) and those of probable, but disputable, pre-natal origin (23 cases, age 13 to 26 days). W. M. Fitzsimmons

716—MAYHEW, R. L., TORBERT, B. J. & MILLER, G. C., 1959. [Department of Veterinary Science, Louisiana State University, Baton Rouge, Louisiana, U.S.A.] "Studies on bovine gastro-intestinal parasites. XX. The results of feeding small amounts of phenothiazine in pure infections of *Cooperia punctata*." **American Journal of Veterinary Research, 20** (76), 492–497.

Calves reared free from natural nematode infections were given pure infections of *Cooperia punctata*. The animals were fed small quantities of phenothiazine, 0·5 gm. to 12·0 gm. daily. Faecal egg counts were unaffected but numbers of larvae recovered from cultures of the faeces of these animals were only a fraction of those recovered when the same animals were not receiving phenothiazine. For untreated calves the yield was 2,000 to 400,000 larvae per culture while during treatment the yield exceeded 50 larvae per culture on only one occasion. Sudden falls in egg production in some animals were not linked with the treatment, and as they were resistant to further infection it is believed that immune responses had intervened.

J. E. D. Keeling

717—MICHEL, J. F., 1959. [Central Veterinary Laboratory, New Haw, Weybridge, Surrey, U.K.] "Recent progress in the study of parasitic bronchitis." **Journal of the Royal Agricultural Society of England, 120,** 28–44.

The author gives an account of the life-cycle and epidemiology of parasitic bronchitis and suggests the use of strip grazing to prevent its establishment in cattle. The need for the development of resistance by means of a light infection is stressed unless very strict segregation of age groups of cattle is maintained whilst grazing. The treatment of the infection by cyanacethydrazide and diethylcarbamazine is mentioned, the former acting on the adult worms and the latter on immature forms. Vaccination with an irradiated vaccine is thought to be of great value but it is stressed that if vaccinated calves are exposed to a sudden extensive infection risk they will become infected and may be carriers. Vaccination is, however, invaluable for giving calves a measured degree of resistance before they are turned out. K. R. Heath

718—NENADIĆ, B. M., 1960. [Veterinarska Stanica Pljevlje, Pljevlja, Yugoslavia.] "Rezultati trogodišnjeg istraživanja bobičavosti goveda zaklanih na gradskoj klaonici u Pljevljima." **Veterinaria. Sarajevo, 9** (3), 597–602. [English summary p. 597.]

6,136 cattle, principally from the former district of Pljevlja, were examined for cysticerciasis at the city abattoir of Pljevlja during 1957, 1958 and 1959. The incidence of infection was respectively 19·96%, 20·99% and 17·13%. Of the total number of 1,178 infected 1,094 were heifers from one to two years old. N. Jones

719—ONO, Y., KIMURA, S. & KUBA, N., 1960. [Institute of Veterinary Medicine, Hyogo Agricultural College, Sasayama, Japan.] "Klinische und hämatologische Untersuchungen der künstlich infizierten Rinderfascioliasis." **Japanese Journal of Parasitology, 9** (1), 49–60. [In Japanese: German summary pp. 57–58.]

A cow was experimentally infected with 3,000 metacercariae of *Fasciola hepatica*. Symptoms of anorexia, serious loss of weight, severe anaemia, diarrhoea, cardiovascular disturbances and well developed oedema of the udder were noted. Haematological findings paralleled the clinical symptoms. A decrease of erythrocytes, leucocytes and haemoglobin and an increase of eosinophils were observed. 393 days after the initial infection, the cow was reinfected with 1,500 metacercariae. Eggs reappeared in the faeces. The intradermal reaction was intensified. Clinical symptoms were very slight, which indicated the existence of a post-infection resistance. A second cow was infected with 1,500 metacercariae, which caused less severe symptoms and an earlier recovery. The second cow was treated by hexachlorethane five times resulting in an improvement in the clinical condition. Complete elimination of the worms, however, was not achieved. Y. Yamao

720—PATNAIK, B., 1960. [Animal Husbandry and Veterinary Services, Orissa, Cuttack, India.] "Treatment of fascioliasis." **Indian Veterinary Journal, 37** (11), 561–569.

Patnaik reviews the literature on the use of carbon tetrachloride and hexachlorethane as anthelmintics and reports on a trial of the drugs on cattle in Cuttack. 15 adult cattle affected with fascioliasis were treated by oral administration of hexachlorethane at a dosage of one ounce per 500 lb. body-weight; a similar group of 19 cattle received 1 c.c. of carbon tetrachloride per 100 lb. body-weight in equal amounts of sterile liquid paraffin subcutaneously. One weak animal in the group treated with hexachlorethane died and the remaining animals in both groups were shown to be cured by subsequent faecal examination. The author gives the reasons why he considers carbon tetrachloride to be the drug of choice. W. M. Fitzsimmons

721—PATYK, S., 1960. [Katedra Parazitologii, Wyższa Szkoła Rolnicza, Wrocław, Norwida 27, Poland.] "Helminths in the alimentary tract of cattle in West Poland." **Acta Parasitologica Polonica, 8** (8/20), 231–253. [Polish summary p. 253.]

About 78·8% of cattle examined at the Wrocław abattoir were infected with helminths. These were one trematode, two cestode and 16 nematode species and of these, *Oesophagostomum radiatum*, *Cooperia punctata*, *Bunostomum phlebotomum*, *Ostertagia lyrata* and *Trichuris discolor* are reported for the first time from Poland. Intensities were low except in the case of *O. ostertagi*, *C. oncophora* and *Haemonchus contortus*. Additional data on the structure of the gubernaculum of *Oesophagostomum radiatum* and *O. venulosum* are given. G. I. Pozniak

722—PAVLOV, V. F. ET AL., 1959. [Acute fascioliasis of cattle in the Lvov area.] **Sbornik Nauchnikh Trudov. Lvovski Zooveterinarni Institut, 9,** 193–202. [In Russian.]

Pavlov *et al.* discuss acute fascioliasis among farm animals, principally cattle, in the Lvov district in 1956. The infection was due chiefly to the wet summer of the preceding year causing great frequency of *Galba truncatula* and its great incidence of infection with the fluke's larvae. Acute fascioliasis was often complicated by abortions and had as effects rapid emaciation, anaemia, eosinophilia, reduced arterial pressure, increased venous pressure, prevalence of potassium over calcium in the blood, disappearance of carotene, etc. Complex therapy, based on the administration of small doses of hexachlorethane, insulin and glucose solution gave positive results but only after hay polluted with the fluke's larvae had been withheld, thus preventing reinfection of the cattle. Rotation of pastures is suggested among other prophylactic measures. The paper is illustrated with photographs and photomicrographs. N. Jones

723—PAVLOV, V. F. & GOLUBEV, A. I., 1959. [Pathogenesis, treatment and prophylaxis of pneumonia in calves with dictyocauliasis.] **Sbornik Nauchnikh Trudov. Lvovski Zooveterinarni Institut, 9,** 241–248. [In Russian.]

Pavlov & Golubev describe an outbreak of pneumonia in calves with *Dictyocaulus* infection observed at a collective farm in the Lvov region. 101 calves were examined clinically. Eight of these received a prolonged treatment with: (i) aqueous iodine solution; (ii) penicillin;

(iii) sulphathiazol; (iv) expectorants; (v) a mixture of Carlsbad salt, anise and cumin seeds and juniper berries; (vi) fish liver oil; (vii) irradiation with ultra-violet rays; and (viii) glucose solution (injected intravenously once a week). The therapy resulted in an improvement of the general condition and of the roentgenoscopic and biochemical aspects within 30 days. One of the eight calves died. Untreated calves, the food and maintenance of which were drastically improved, were better clinically than the treated calves, had a better growth rate and were fatter. N. Jones

*724—ROSCA, V., VISAN, C., VASS, A. & ROSCA, V., 1957. [Observations sur la dictyocaulose bovine dans la région de Baia Mare.] **Probleme Veterinare. Bucharest,** Year 1957, No. 1, pp. 28–37. [In Rumanian: French summary.]

725—SKOVRONSKI, R. V., 1959. [Carbohydrate metabolism in calves with dictyocauliasis.] **Sbornik Nauchnikh Trudov. Lvovski Zooveterinarni Institut, 9,** 227–232. [In Russian.]
Skovronski has studied the levels of sugar, inorganic and acid-soluble phosphorus and lactic acid in the blood of six calves experimentally infected with *Dictyocaulus viviparus* and in 30 naturally infected calves. 65 to 140 infective larvae per kg. body-weight were used in the infections. In the experimental infections biochemical changes in the blood developed parallel with the clinical symptoms and, in particular, with dyspnoea. Their extent was also in direct relation to the number of infective larvae administered. Before infection the average levels of sugar, inorganic phosphorus, acid-soluble phosphorus and lactic acid were respectively: 52 mg.%, 6·4%, 9·5 mg.% and 5 mg.%. In calves with serious clinical symptoms these levels were: sugar 42 mg.%, phosphorus 3·9%, acid-soluble phosphorus 6·3 mg.%. The level of lactic acid dropped to 4·5 mg.% in five calves but rose to 14·5 mg.% and remained there until the death of the calf in one case. In calves naturally infected with *Dictyocaulus* the sugar and phosphorus levels were low in the case of severe and medium clinical aspects but the level of lactic acid remained normal. N. Jones

726—SUPPERER, R. & PFEIFFER, H., 1960. [Institut für Allgemeine Zoologie und Parasitenkunde, Tierärztliche Hochschule, Wien, Austria.] "Über die Strongyloidose der Kälber." **Wiener Tierärztliche Monatsschrift, 47** (6), 361–368. [English, French & Italian summaries pp. 367–368.]
The authors report that in Austria 35% of calves aged approximately four weeks carry light infection of *Strongyloides papillosus*. They have investigated the elimination of eggs and possible symptoms in calves with single or repeated experimental infections of varying severity. The treatment, Neguvon in doses of 90 mg. per kg. body-weight, has proved highly efficient; for animals in poor condition only 75 mg. per kg. is recommended. G. I. Pozniak

727—UGRIN, I. N., 1959. [Respiration and clinical symptoms in calves with dictyocauliasis.] **Sbornik Nauchnikh Trudov. Lvovski Zooveterinarni Institut, 9,** 233–240. [In Russian.]
Ugrin reports on the clinical symptoms and on the gaseous exchange in six calves, aged three to four months, experimentally infected with *Dictyocaulus viviparus*. The animals received 65 to 149 infective larvae per kg. body-weight. The gravity of clinical symptoms and the outcome depended upon the intensity of infection. The first of the symptoms to appear was dyspnoea on the 11th to 14th day. Those animals which received over 100 larvae per kg. died 16 to 54 days after infection; the others recovered and larvae disappeared from the faeces after two to three months. The following changes in gaseous exchange in heavily infected calves were observed: (i) increase of momentary ventilation of the lungs; (ii) increase of respiratory rate; (iii) increase of oxygen intake; (iv) reduction of the respiratory coefficient. N. Jones

Sheep and Goats

728—ANON., 1960. "*Nematodirus* disease in lambs. **Advisory Leaflet. Ministry of Agriculture, Fisheries and Food. London, No. 491,** 3 pp. [Revised.]

729—BANKS, A. W. & KORTHALS, A., 1960. [Institute of Medical and Veterinary Science, Adelaide, South Australia.] "The anthelmintic efficiency of phenothiazine and of bephenium in sheep." **Australian Veterinary Journal, 36** (9), 383–386.

In South Australia, where *Trichostrongylus* infections of sheep are of considerable importance, a highly purified phenothiazine and bephenium hydroxynaphthoate were tested on a flock of Merino and cross-bred weaners emaciated from starvation and heavy worm burden. The anthelmintic efficiency of phenothiazine (dosage rate 15 gm.) and bephenium (dosage rate 5·4 gm.) were 87% and 55% respectively for intestinal *Trichostrongylus* spp., 95% and not significant for abomasal *Trichostrongylus* spp., 67% and 75% for *Ostertagia* spp. and 84% and 100% for *Nematodirus filicollis* (*N. battus* was not present). There were no severe reactions to the drug. Details of materials and methods used, nematode species present and worm burdens of the test sheep are included. W. M. Fitzsimmons

730—BEGOVIĆ, S. ET AL., 1960. [Zavod za patofiziologiju, Veterinarski fakultet, Univerzitet u Sarajevu, Yugoslavia.] "Šta pokazuju parazitološke, hematološke i serološko-biohemijske analize kod jedne grupe invadiranih ovaca." **Veterinaria. Sarajevo, 9** (1), 9–20. [English summary p. 9.]

Begović *et al.* carried out parasitological, haematological and serological examinations of 20 sheep from the region of Western Bosnia. Faecal examinations, the results of which are tabulated, revealed infections with *Fasciola hepatica* in 7, *Dicrocoelium dendriticum* in 16, anoplocephalids in 6, *Strongyloides* sp. in 10, *Trichuris ovis* in one, lungworms in 6 and intestinal strongyles in all the animals examined. N. Jones

731—BEGOVIĆ, S. ET AL., 1960. [Zavod za patofiziologiju, Veterinarski fakultet, Univerzitet u Sarajevu, Yugoslavia.] "Odnos frakcija serumskih proteina i sadržaj azota slobodnih aminokiselina kod invadiranih ovaca." **Veterinaria. Sarajevo, 9** (1), 21–28. [English summary p. 21.]

After referring to their previous paper on the parasitological and laboratory examination of 20 helminth-infected sheep [see the preceding abstract], Begović *et al.* report on the following serological findings: (i) in chronic infections with *Fasciola hepatica* and *Dicrocoelium dendriticum*, the albumin content is reduced and that of gamma globulins is increased; (ii) in acute fascioliasis the level of alpha globulins is increased and that of albumin is slightly reduced; (iii) in heavy infections with intestinal strongyles and lighter infections with *Dicrocoelium* and *Fasciola* no significant deviations from the normal were observed in the electroferrograms; and (iv) in all infections a low level of serum proteins and amino-nitrogen was found. N. Jones

732—BLACK, W. J. M., 1959. [King's College, Newcastle-upon-Tyne, U.K.] "A grassland management method of controlling *Nematodirus* infestation." **Journal of the British Grassland Society, 14** (3), 206–211.

Black describes an experiment to test the method of delayed stocking for the control of *Nematodirus* infections in lambs. He compared the infections in two groups of ewes and lambs grazed on pastures on which *Nematodirus* infections were known to occur. One group was grazed on a pasture which had not been stocked during the spring and summer of the previous year; the other group was grazed on pasture which had been grazed normally during the *Nematodirus* season of the previous year. During early June seven of the 32 test lambs of the latter group died as a result of *Nematodirus* infection but none of the former group died. Figures are given of larval counts, egg counts and live weight gains to demonstrate the effectiveness of the method. Towards the end of the experiment all the lambs were dosed with bephenium embonate but the considerable differences between the condition of the lambs in the two groups persisted. H. D. Crofton

733—BROWN, T. H., 1959. [Grassland Research Institute, Hurley, Berks, U.K.] "Parasitism in the ewe and the lamb." **Journal of the British Grassland Society, 14** (3), 216–220.

Brown discusses the influence of parasitic infection in ewes on the progress of their lambs. He discusses the significance of the spring rise in egg counts and the role of ewes in the reduction of pasture infestation. Figures are given to show the relationship between milk supply and levels of infection in lambs. The significance of loss of weight in lambs at weaning time is also considered. H. D. Crofton

734—CHOWANIEC, W., WERTEJUK, M., ŻARNOWSKI, E. & DARSKI, J., 1960. [Zakład Parazytologii i Chorób Inwazyjnych, Instytut Weterynarii, Puławy, Poland.] "Domięśniowe stosowanie czterochlorku węgla przy motylicy wątrobowej owiec." **Medycyna Weterynaryjna, 16** (7), 398–400. [English, French, German & Russian summaries p. 400.]

Chowaniec *et al.* treated 154 sheep against fascioliasis with a 1 : 1 mixture of carbon tetrachloride and liquid paraffin, injected intramuscularly. The doses ranged from 1 ml. to 2 ml. The efficacy of the treatment, as assessed by faecal and post-mortem examinations two to three weeks later, was 90%. Toxic symptoms were observed in only one case. Local symptoms, i.e. pain caused by the drug, were greatly reduced by simultaneous injections of 1 ml. of 2% tutocaine solution.

N. Jones

735—CHRISTIE, M. G., 1960. [Moredun Institute, Gilmerton, Edinburgh 9, Scotland.] "Resistance to *Trichostrongylus colubriformis* produced by X-irradiated larvae." [Correspondence.] **Veterinary Record, 72** (45), 992–993.

Christie comments on the letter by Jarrett *et al.*, on the possibility of producing X-irradiated *Trichostrongylus colubriformis* vaccine [see abstract No. 741 below] and suggests that the immunity produced was not due to larvae damaged by X-rays but instead due to a limited infection produced by unscathed surviving larvae (possibly giving rise to females with reduced reproductive capacity) after most were killed by the X-rays. He asks for clarification of a number of detailed questions on the report by Jarrett and his co-workers.

W. M. Fitzsimmons

736—DRUDGE, J. H., LELAND, Jr., S. E., WYANT, Z. N., ELAM, G. W. & HUTZLER, L. B., 1959. [Department of Animal Pathology, Kentucky Agricultural Experiment Station, Lexington, Kentucky, U.S.A.] "Strain variation in the response of sheep nematodes to the action of phenothiazine. IV. Efficacy of single therapeutic doses for the removal of *Haemonchus contortus*." **American Journal of Veterinary Research, 20** (77), 670–676.

Groups of helminth-free lambs were infected with two strains of *Haemonchus contortus*. One group of 21 lambs received Strain A, which was susceptible to phenothiazine at normal dose levels and a similar group received Strain B which had a drug susceptibility threshold four to eight times higher than A during treatment with small daily doses of phenothiazine. Single therapeutic doses of commercial grade (N.F. green) phenothiazine were tested against the two strains. At dose levels of 0·1 gm. per lb. body-weight, 0·25 gm. per lb. and 0·5 gm. per lb. Strain A was more susceptible to treatment. This was shown by the larger percentage of adult worms removed and the reduction in numbers of eggs and larvae produced by the surviving females. Males of both strains were more resistant to treatment than females. The susceptibility thresholds of the two strains showed only a 2·5-fold difference by the single dose regimen.

J. E. D. Keeling

737—DUNSMORE, J. D., 1960. [Department of Pathology, University of Sydney, N.S.W., Australia.] "Anthelmintic treatment of the smaller abomasal trichostrongyles of sheep" **Veterinary Record, 72** (29), 573–578.

Dunsmore conducted two controlled experiments to study the anthelmintic efficiency of two phenothiazine preparations, 0,0-dimethylhydroxy-2,2,2-trichlorophosphonate (Bayer L 13/59), 3-chloro-4-methyl-7-oxycoumarine diethyl thiophosphoric acid (Bayer 21/199), bephenium embonate and bephenium hydroxynaphthoate against adult and immature *Ostertagia* species and against adult *Trichostrongylus axei* in naturally infected sheep. The two phenothiazine preparations, which were of similar particle size, gave significantly different anthelmintic efficiencies. The more active phenothiazine preparation was highly efficient against the adults of both parasites and moderately effective against immature *Ostertagia*. The efficiency of both of the phenothiazine preparations was significantly higher when the drug was injected into the rumen than when drenched into the abomasum after swabbing the pharynx with 10% copper sulphate solution; Dunsmore suggests a possible explanation for this difference. Bayer L 13/59 and Bayer 21/199 were ineffective when administered by injection into the rumen. Bayer L 13/59 was highly effective against adult *Ostertagia* and *T. axei* and also against immature *Ostertagia* when given orally after swabbing the pharynx with 10% copper sulphate. Bayer 21/199 was not tested by administration into the abomasum.

Bephenium embonate was ineffective against either parasite, whether the drug was directed into the rumen or into the abomasum. Bephenium hydroxynaphthoate, when injected into the rumen, was moderately effective against immature *Ostertagia* and *T. axei* but ineffective against adult *Ostertagia*. However, bephenium hydroxynaphthoate, when given orally after swabbing the pharynx with 10% copper sulphate, was highly effective against all stages of *Ostertagia* and against adult *T. axei*. Dunsmore states that it appears that the organic phosphorus compounds and bephenium compounds have no advantage over phenothiazine for treatment against these parasites. It was found in all of the trials, that *Ostertagia* species were less susceptible to treatment than were *T. axei*. C. Hatch

738—FROMUNDA, V. & CIOUCA, T., 1959. "Cercetări comparative asupra valorii terapeutice a soluției iod-iodurate și a fenotiazinei solubilizate, administrate intratraheal, in dictiocauloza ovina." **Probleme de Parazitologie Veterinara. Institutul de Patologie si Igiena Animala, Bucharest,** No. 7, pp. 27–37. [French & Russian summaries pp. 36–37.]

803 sheep were treated with phenothiazine, dissolved in camphor oil and ether, and another 325, with the exception of 18 controls, were treated with aqueous solution of iodine. Both drugs were administered intratracheally. The animals presented sub-clinical symptoms of dictyocauliasis and faecal examination indicated the incidence of infection to be 37·8%. The efficacy of iodine solution was found to be 22·2% and that of phenothiazine solution 13·7%. No side effects were observed. The average weight gain 32 days after treatment was 3·5 kg. in the group treated with iodine, 3·7 kg. in that treated with phenothiazine solution and 2·0 kg. in the controls. N. Jones

739—GARDINER, M. R. & PARNELL, I. W., 1960. [Animal Health & Nutrition Laboratory, Perth, Western Australia.] "A note on the possible association of *Muellerius capillaris* with exterotoxaemia." **British Veterinary Journal, 116** (7), 247–251.

The authors describe an outbreak of enterotoxaemia in ewes in south-western Australia. Extremely potent *Clostridium welchii* Type D toxin was demonstrated. The flock had been immunized once with Pulpy Kidney Toxoid before the outbreak. Pasture growth was very rank and the best ewes were affected. It is suggested that the protection afforded by this first immunizing dose was inadequate in the face of the intensity of challenge due to a linking-up of heavy toxin production and damage to the intestinal wall by the larvae of *Muellerius capillaris* in the course of a severe invasion by this lungworm. W. M. Fitzsimmons

740—GRACEY, J. F. & TODD, J. R., 1960. [Veterinary Research Division, Ministry of Agriculture for Northern Ireland, The Farm, Stormont, Belfast, Northern Ireland. "Chronic copper poisoning in sheep following the use of copper sulphate as a molluscicide." **British Veterinary Journal, 116** (11), 405–408.

1% copper sulphate solution sprayed on pasture at the rate of 50 gallons per acre (5 lb. copper sulphate per acre) in September 1959 resulted in six deaths in a flock of 95 sheep put on the pasture three weeks after the spraying. The deaths started after two months on the pasture, whereupon the flock was removed, and continued until 17th January 1960. Post-mortem findings were of generalized icterus. Details are given of blood, liver, foetal liver, kidney and pericardial fluid copper levels in the flock and of copper content of the herbage. The latter persisted at a high level (up to 200 p.p.m. in dry matter) throughout the winter despite heavy rain and flooding. A clinical trial of dimercaptopropanol (BAL) confirmed that it is of little value in hastening excretion of copper accumulated in the liver. W. M. Fitzsimmons

741—JARRETT, W. F. H., JENNINGS, F. W., McINTYRE, W. I. M. & SHARP, N. C. C., 1960. [University of Glasgow Veterinary School, Bearsden, Glasgow, Scotland.] "Resistance to *Trichostrongylus colubriformis* produced by X-irradiated larvae." [Correspondence.] **Veterinary Record, 72** (42), 884.

Jarrett *et al.* report on preliminary experiments which seem to indicate the possibility of developing an X-irradiated larva vaccine against *Trichostrongylus colubriformis* infection in sheep. W. M. Fitzsimmons

742—KADIROV, N. T., 1959. [Albasarskaya vetbaklaboratoriya, Akmolinsk oblast, U.S.S.R.] [The epizootiology of monieziasis and coenuriasis of sheep in the Akmolinsk region.] **Veterinariya, 36** (9), 30–32. [In Russian.]

In the Akmolin area of Kazakhstan, *Moniezia* eggs and proglottides were first passed by lambs aged up to one year during late June, indicating infection in early May soon after the lambs had been put on pasture. Two peaks of infection occurred, one in July (57·1%) and a second in October (39·7%). In yearlings, the highest infection rates were seen in December (22·2%) and in July to August (12·6%). There was no seasonal variation in sheep aged over two years. Both *M. expansa* and *M. benedeni* were present. 242 of 354 sheep heads examined for *Coenurus* were infected and of these 97 were lambs, 126 yearlings and only 19 were sheep aged over two years. 49% of the total number of sheep lost during a year was during February to April, with a second peak of 19·8% in June to July. Infection probably took place the previous autumn when there is greatest contact with sheep-dogs. Kadirov proposes measures and times of treatment suitable to this area. G. I. Pozniak

743—KHANBEGYAN, R. A., 1960. [Armyanski nauchno-issledovatelski institut zhivotnovodstva i veterinarii, U.S.S.R.] [The combined use of hexachlorethane and carbon tetrachloride against chronic fascioliasis in sheep and goats.] **Veterinariya, 37** (6), 34–37. [In Russian.]

Good anthelmintic effects were obtained against *Fasciola gigantica* in experimentally infected sheep with the combined administrations *per os* of hexachlorethane and carbon tetrachloride. This treatment was compared with the effect of these drugs given separately in their maximal therapeutic doses in field experiments involving over 5,000 sheep and goats. A dose of 0·2 gm. of hexachlorethane per kg. body-weight given *per os* together with 1 ml. of carbon tetrachloride was the most effective (94% to 100%). Half of these doses of hexachlorethane with the same amount of carbon tetrachloride (1 ml.) gave an extens-efficacy of 84·5% to 95·3%. The efficacy obtained with hexachlorethane alone, given *per os* at a dose of 0·2 gm. per kg. was 65·2%, and with carbon tetrachloride also given *per os*, in a single dose of 2 ml., 70% to 78%. The combined therapy had no side effects. N. Jones

744—LEVI, I. & JAŠAREVIĆ, A., 1960. [Veterinarski Zavod Sarajevo, Yugoslavia.] "Jednokratno liječenje ovaca fenotijazinom i finansijski efekat toga liječenja." **Veterinaria. Sarajevo, 9** (3), 593–595. [English summary p. 593.]

Single applications of phenothiazine (0·5 gm. per kg. body-weight but not exceeding the maximum dose) by drenching in 158 sheep and lambs resulted 45 days later in the average weight increase per head being greater by 1,335 gm. than in the control group (83 sheep and lambs). Before the treatment the major infections were due to *Ostertagia circumcincta*, *O. trifurcata*, *Teladorsagia davtiani*, *Trichostrongylus axei*, *Nematodirus filicollis*, *N. spathiger* and *Trichuris ovis*. *Moniezia* sp. and *Dictyocaulus filaria* were found to a lesser extent. N. Jones

745—McCLEERY, E. F. & WIGGINS, G. S., 1960. [Metropolitan Cattle Market, Islington, London, England.] "A note on the occurrence of *Cysticercus ovis* in sheep derived from sources within the United Kingdom." **Veterinary Record, 72** (43), 901–903.

Of a total of 59,415 British sheep examined at meat inspection in 1959, 115 (0·194%) were infected with *Cysticercus ovis*. 41% of the infections were in sheep from Cumberland, 15% from Kent and about 4% from the rest of the U.K. The cysts, frequently containing pus or partly calcified, were equally common in all age groups of slaughtered sheep and occurred most frequently in the heart and diaphragm, but were also noted in most muscles of the carcass. Cysts may be present in the carcass muscle when absent from the heart, and it is possible that they may escape detection until the carcass is jointed or even bought by the consumer. The authors stress the desirability of making exploratory incisions into the musculature when cysts are detected in any position. W. M. Fitzsimmons

746—NIKOLSKI, Y. D., 1959. [The epizootiology of the more important helminthiases of sheep in the Kashka-Darinsk area of the Uzbekistan S.S.R.] **Sbornik Nauchnikh Trudov Uzbekskoi Akademii Selskokhozyaistvennikh Nauk,** No. 13, pp. 95–101. [In Russian.]

Nikolski carried out post-mortem examinations of 51 sheep in the foot-hill zone and 29 sheep in the semi-arid zone in the Kashka-Darinsk District of Uzbekistan. The examinations

revealed 38 helminth species, of which the following were found for the first time in sheep in Uzbekistan: *Nematodirus abnormalis*, *Nematodirella longissimespiculata*, *Cooperia oncophora*, *Skrjabinagia lyrata*, *Strongyloides papillosus* and *Cystocaulus nigrescens*. Dictyocauliasis, haemonchiasis, hydatid disease and coenuriasis were found to be the principal helminthiases in the semi-arid zone. The first three of these were also the most important in the foot-hill zone together with bunostomiasis, muelleriasis, monieziasis and fascioliasis. The author goes on to discuss the epizootiology, dynamics and prophylaxis of the more important helminthiases in sheep and also in goats in both zones of the district. N. Jones

747—ROSE, J. H., 1960.—[Central Veterinary Laboratory, New Haw, Weybridge, Surrey, U.K.] "*Teladorsagia davtiani* Andreeva and Satubaldin, 1954, in British sheep." [Correspondence.] **Veterinary Record, 72** (47), 1062.

Rose records *Teladorsagia davtiani* Andreeva & Satubaldin, 1954 from sheep in the south-east of England. This is a new parasite record for British sheep. He points out the similarity to *Ostertagia trifurcata* and that *Teladorsagia* is distinguished by the presence of powerful supportive apparatus to the genital cone, the presence of sessile papillae on the end of the genital cone and the absence of an accessory bursal membrane. W. M. Fitzsimmons

748—RUKAVINA, J. ET AL., 1960. [Veterinarski Fakultet, Univerzitet u Sarajevu, Sarajevo, Yugoslavia.] "Stanje zdravlja ovaca na nekim poljoprivrednim dobrima. Rezultati kompleksnih istraživanja stanja parazitarnih i zaraznih oboljenja, te analiza krvi ovaca i stočne hrane u 1959 godini na nekim poljoprivrednim dobrima u Bosni." **Veterinaria. Sarajevo, 9** (3), 497–514. [English summary p. 497.]

Rukavina *et al.* investigated the parasitic and infectious diseases of sheep mainly at five agricultural estates in Bosnia in 1959. The greatest incidence and degree of infection were those of nematodes, especially Trichostrongylidae. *Moniezia expansa* cysticercoids were found in 17 of the 46 species of oribatid mites examined. One (*Protoribates lophotrichus*) is recorded as an intermediate host of this tapeworm for the first time. Haematological and biochemical analyses as well as analyses of hay and silage for winter feeding showed lack of calcium, phosphorus and of certain trace elements on some of the estates. The intensity of infection was in inverse proportion to the quality of the fodder. N. Jones

749—RUKAVINA, J., DELIĆ, S., ČANKOVIĆ, M. & MARKOTIĆ, B., 1960. [Zavod za parazitologiju i invazione bolesti, Veterinarski fakultet, Univerzitet u Sarajevu, Yugoslavia.] "Primjena dictina u terapiji diktiokauloze ovaca." **Veterinaria. Sarajevo, 9** (1), 81–87. [English summary p. 81.]

Autopsy of seven out of a flock of some 300 lambs revealed that most of them had *Dictyocaulus filaria* infection and that *Protostrongylus rufescens* was present in two. Other helminths found were *Ostertagia circumcincta*, *O. trifurcata*, *Teladorsagia davtiani*, *Trichostrongylus colubriformis*, *T. vitrinus*, *T. axei*, *Haemonchus contortus*, *Nematodirus spathiger*, *N. filicollis*, *Strongyloides papillosus*, *Bunostumum trigonocephalum*, *Trichuris ovis*, *Chabertia ovina*, *Dicrocoelium dendriticum*, *Moniezia expansa*, *Cysticercus tenuicollis* and hydatid. The infections were heavy and the animals were treated with phenothiazine suspension at a dose of 0·5 gm. per kg. body-weight. Seven days later three successive subcutaneous injections of Dictin (cyanacethydrazide solution in distilled water, 1 : 4) were given, at a dose of 1 c.c. per 12·5 kg. body-weight. Faecal examination of 93 lambs a week after treatment showed only one *D. filaria* larva in the faeces of one, compared with their presence in the faeces of all animals examined before treatment. Post-mortem examinations of four treated animals showed a few *D. filaria* in two and *Protostrongylus rufescens* in one. The gastro-intestinal nematodes were still present but only 5% to 10% of the numbers before treatment. Only the numbers of *Trichuris ovis* were not diminished. N. Jones

750—SARIMSAKOV, F. S., 1959. [The epizootiology of *Bunostomum* infection in sheep and goats in Uzbekistan.] **Sbornik Nauchnikh Trudov Uzbekskoi Akademii Selskokhozyaistvennikh Nauk,** No. 13, pp. 102–111. [In Russian.]

Epizootiological studies of bunostomiasis of sheep and goats, carried out in Uzbekistan during 1953–55, showed that the causative agent was *Bunostomum trigonocephalum*. Only one specimen of *B. phlebotomum* was found. The average incidence was 1·1% in the semi-arid

zone and 83·1% in the foot-hill zone. The average degree of infection was only two parasites per animal in the former but 162 in the latter zone. It was found at post-mortem of 390 sheep and lambs carried out in the foot-hill zone that: (i) the highest incidence and degree of infection was in the autumn and the lowest in the summer; (ii) lambs were infected to a lesser extent than adult sheep; (iii) age immunity is absent in foci of latent infection; (iv) sheep became infected throughout the year but principally during the summer and autumn; (v) the duration of infection is the same for both sexes of parasite; (vi) the normal localization of the parasite is in the small intestine. Post-mortem examinations of 173 goats in the same zone revealed the mean incidence of infection to be 15% and the mean degree of infection 10·9 parasites per animal. N. Jones

751—SVADZHYAN, P. K., 1957. [A new insecticide for the control of ants—the intermediate host of dicrocoeliasis in sheep. (Preliminary note.)] **Izvestiya Akademii Nauk Armyanskoi SSR. Biologicheskie i Selskokhozyaistvennie Nauki, 10** (9), 93–96. [In Armenian: Russian summary p. 95.]

Svadzhyan gives a preliminary report on the use of chlorcrotylthiocyanate against the ants which are the intermediate hosts of *Dicrocoelium dendriticum*. The new compound is obtained as a by-product of the local chemical industry and is recommended in the form of a 2·5% emulsion in heavily infected ant foci. N. Jones

752—SVADZHYAN, P. K., MIKAELYAN, S. T. & ALAKHVERDYAN, O. G., 1960. [Copper sulphate and tin arsenate against monieziasis in sheep.] **Veterinariya, 37** (7), 41–42. [In Russian.]

In comparative tests against monieziasis, 340 three to five-month-old lambs which had received no food for 15 hours were each treated with 35 ml. to 45 ml. of copper sulphate, without subsequent purging, and 330 lambs were each given 0·6 gm. of tin arsenate. 150 lambs served as controls. Faecal examination on the tenth day showed 84% efficacy with copper sulphate and 79% with tin arsenate. More strobilae and proglottides were passed with the former than with the latter. The same chemicals were used on another 1,000 lambs carrying 15 to 20 parasites per animal and here the efficacy of copper sulphate was 78% to 83% and that of tin arsenate 65% to 72%. N. Jones

753—TRACH, V. N., 1957. [The helminth fauna of sheep in the Kiev Polesie.] **Trudi Instituta Zoologii. Akademiya Nauk Ukrainskoi SSR, 14,** 32–42. [In Ukrainian: Russian summary p. 42.]

Faecal and post-mortem examination of sheep from eight areas of Kiev Polesie revealed 100% to be infected with nematodes (32 species), 50% with trematodes (three species) and 30% with cestodes (three species). The most frequently occurring species within these three groups were various Strongylata, *Moniezia* spp. and *Fasciola hepatica*. Females of *Ostertagia* and *Haemonchus* were found to exhibit great variability, and these new forms, not conforming to any of the known species, are briefly described. G. I. Pozniak

754—TURNER, J. H., SHALKOP, W. T. & WILSON, G. I., 1960. [Animal Disease and Parasite Research Division, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Maryland, U.S.A.] "Experimental strongyloidiasis in sheep and goats. IV. Migration of *Strongyloides papillosus* in lambs and accompanying pathologic changes following percutaneous infection." **American Journal of Veterinary Research, 21** (83), 536–546.

It is demonstrated that the migration route of larvae of *Strongyloides papillosus* after infection of lambs by skin penetration is similar to that of other species, viz., by the blood to the lungs, then through the capillary walls into the bronchial tree and thence up the trachea, down the oesophagus and through the stomach to the intestine. Infective larvae are found in the blood from 12 to 72 hours after infection. The entire migration occupied a minimum of three-and-a-half days and the minimum prepatent period is nine days. Stray larvae were recovered from gracilis muscle, loin and diaphragm and from the abdominal, pleural and pericardial cavities. Larvae were found in the skin between 15 minutes and 48 hours after exposure. No dermatitis resulted in susceptible lambs exposed to single infections. After the fifth and subsequent exposures, pustular erythematous dermatitis developed. Oedema, petechial, and later ecchymotic, haemorrhages were observed in the lungs between 48 and 113 hours after infection,

after which they subsided until the lungs appeared normal 15 days after infection. Details of experimental methods and pathological findings are given. The paper is illustrated by photographs and photomicrographs. W. M. Fitzsimmons

755—VETTER, R. L., 1960. [University of Wisconsin, U.S.A.] "I. The effect of calcium and phosphorus supplementation on the resistance of lambs to internal parasite infection. II. Effects of feeding lambs natural versus semi-purified diets on the stomach worm, *Haemonchus contortus*." **Dissertation Abstracts, 21** (3), 400–401.

756—ŽUKOVIĆ, M., WIKERHAUSER, T. & BENCĔVIĆ, K., 1960. [Zavod za parasitologiju i nametničke bolesti, Veterinarski fakultet, Sveučilište u Zagrebu, Yugoslavia.] "Komparativna istraživanja djelovanja olovnog arsenata i bakrenog sulfata u liječenju trakavičavosti ovaca." **Veterinarski Arhiv, 30** (9/10), 259–262. [English & French summaries pp. 261–262.]

Monieziasis was treated with 1 gm. of lead arsenate per animal, given in a gelatin capsule, in 22 lambs aged two to three months. 10 of these lambs also received 20 gm. to 30 gm. of sodium sulphate two hours later. Another group of 10 lambs was treated with 30 c.c. to 35 c.c. of 1·25% copper sulphate solution, while another 10 lambs served as controls. The drugs were administered following 12 hours' starvation. 14 days later it was found that animals treated with lead arsenate were completely cured; three of those that had received copper sulphate remained positive. The rest of the flock (with an incidence of infection about 85%) was also treated; 130 sheep were treated with lead arsenate and 144 with copper sulphate. Faecal examinations of 20 animals in each group carried out 10 days after treatment, were all negative in the first group, whereas five sheep remained positive in the second group. The following helminths were found at post-mortem examinations of the lambs: *Moniezia expansa*, *Cysticercus tenuicollis*, *Bunostomum trigonocephalum*, *Trichostrongylus colubriformis*, *Ostertagia circumcincta*, *Nematodirus filicollis* and *Dictyocaulus filaria*. N. Jones

Pigs

757—BATTE, E. G., HARKEMA, R. & OSBORNE, J. C., 1960. [Department of Animal Industry, North Carolina Agricultural Experiment Station, Raleigh, North Carolina, U.S.A.] "Observations on the life cycle and pathogenicity of the swine kidney worm (*Stephanurus dentatus*)." **Journal of the American Veterinary Medical Association, 136** (12), 622–625.

The economic importance of *Stephanurus dentatus* to the swine industry in the U.S.A. is stressed. Studies showed that most of the ova of this parasite are expelled in the terminal urine; the limiting temperatures for hatching ova are 16°C. and 37·5°C. (optimum 27·5°C. with incubation for 24 hours); at temperatures above the optimum, incubation is shortened but percentage hatch is decreased; most larvae remain at ground level and do not occur above the first inch of herbage or below ground; after exposure to infection in the laboratory 18 out of 33 earthworms contained larvae; no earthworms collected from known contaminated areas were found to be naturally infected; longevity of adult worms is over 24 months; infection of pigs can take place through unbroken skin, by ingestion of infective larvae or by eating infected earthworms—in all cases, immature worms spend four to nine months in the liver before migrating to the vicinity of the ureters; 9 to 16 months are required to reach patency. Eosinophilia, hepatic and pancreatic abscesses and extensive fibrosis occur in calves and swine as a result of infection. W. M. Fitzsimmons

758—BULJEVIĆ, S. M., 1960. "Prilog poznavanju migracionog puta *Gnathostoma hispidum* u organizmu svinje. (Prethodno saopćenje.)" **Veterinarski Arhiv, 30** (9/10), 268–271. [English & French summaries pp. 270–271.]

Buljević gives a preliminary report on the migration route of *Gnathostoma hispidum* in pigs. Anatomo-pathological changes caused by this parasite were studied in detail in 18 pigs. Numerous parasites 6 mm. to 10 mm. long were found in the lumen of the hepatic arteries. Immature specimens were frequently observed in the inflammatory processes of arterial walls. Young worms were also observed outside the arteries and even in the hepatic parenchyma. Parasites 7 mm. to 12 mm. long were found in the subserous layer of the stomach, where remains of disintegrated worms were also present These parasites have never been found in the veins. N. Jones

759—GOSSETT, F. O. & McCOWEN, M. C., 1960. [Agricultural Research Center, Eli Lilly & Co., Greenfield, Indiana, U.S.A.] "The effect of hygromycin B on intestinal helminths in swine." **Veterinary Medicine, 55** (3), 68–71.

From seven similar groups of six pigs with initial live body-weights of approximately 50 lb., four groups were fed a complete ration containing ten million, twenty million, forty million and eighty million units of refined hygromycin B per ton for five weeks. Two groups received heat-dried crude culture of *Streptomyces hygroscopicus* and one was a control. Anthelmintic activity was demonstrated against *Ascaris lumbricoides*, *Oesophagostomum* spp. and *Trichuris suis* in all treated groups and the two highest rates were completely effective. Results were assessed by faecal egg counts and by post-mortem worm counts. No undesirable side effects were noted.

P. L. Thomas

760—POGREBNYAK, L. P., 1957. [The epizootiology of *Metastrongylus* infection of pigs in the Ukraine.] **Trudi Instituta Zoologii. Akademiya Nauk Ukrainskoi SSR, 14,** 25–27. [In Ukrainian: Russian summary p. 27.]

In the Ukraine S.S.R., two peaks of *Metastrongylus* infection in pigs occur; the first, in July to August, is the result of infection in the spring when the pigs are first allowed on pasture, and the second, towards the end of the year, follows their pasturing on harvested fields which have been treated with pig manure. The infection rates are higher in the forest and forest-steppe zones of the Ukraine than in its southern part.

G. I. Pozniak

761—POGREBNYAK, L. P., 1957. [The epizootiology of ascariasis in pigs in the Ukraine.] **Trudi Instituta Zoologii. Akademiya Nauk Ukrainskoi SSR, 14,** 28–31. [In Ukrainian: Russian summary p. 31.]

Ascariasis in pigs was shown to be wide-spread in several areas of the Ukraine S.S.R. The seasonal dynamics characteristic for the Ukraine are a peak of infection during November-December, followed by a considerable fall lasting till April and a second rise in June-July. These peaks are the result of infection of animals in April and again in August-October.

G. I. Pozniak

762—SHELTON, G. C., MAGNER, J. M. & SANTMYER, P. H., 1959. [Department of Veterinary Bacteriology & Parasitology, School of Veterinary Medicine, University of Missouri, Columbia, Miss, U.S.A.] "Sodium pentachlorophenate as an ovicide for controlling ascariasis in swine." **Journal of the American Veterinary Medical Association, 135** (4), 229–233.

In two plot tests with sows and their litters sodium pentachlorophenate applied once at 12 oz. per 100 sq. ft., reduced liver scarring due to migratory ascarid larvae. In a third test this effect could not be demonstrated. It is suggested that the chemical may have been diluted by the excessive water content of soil in the experimental plots. No reduction occurred in the numbers of *Ascaris suum* found in the small intestines of the pigs.

J. E. D. Keeling

763—STOICAN, E. & ENACHE, A., 1960. "Fenotiazina, piperazina şi citratul de piperazină ca antihelmintice administrate la grupe mari de porcine." **Probleme de Parazitologie Veterinara. Institutul de Patologie si Igiena Animala, Bucharest,** No. 8, pp. 35–45. [French & Russian summaries pp. 44–45.]

Stoican & Enache tested phenothiazine, phenobent, piperazine and piperazine citrate in the treatment of about 1,100 pigs against *Ascaris suum*, *Oesophagostomum dentatum* and *Trichuris trichiura*. The incidence ranged from 20% to 87·5%. The drugs were given in one quarter of the morning's ration at doses ranging from 0·1 gm. to 0·3 gm. per kg. body-weight and given as two daily doses repeated after 15 to 30 days. Phenothiazine gave similar results to those obtained with phenobent. The best results were obtained when two consecutive daily doses each of 0·3 gm. piperazine citrate per kg. given on an empty stomach were repeated after 15 to 20 days. The efficacy of this treatment was 69% to 100% against ascariasis, 47% against trichuriasis, 90% to 100% against oesophagostomiasis. Animals treated with piperazine citrate had an average daily weight gain of 360 gm. to 585 gm. compared with that of the controls which was 166 gm. to 250 gm.

N. Jones

764—SUPPERER, R. & PFEIFFER, H., 1960. [Institut für Allgemeine Zoologie und Parasitenkunde, Tierärztliche Hochschule, Wien, Austria.] "Untersuchungen über die Wirkung von Hygromycin B auf Darmparasiten des Schweines." **Wiener Tierärztliche Monatsschrift, 47** (3), 165–172. [English, French & Italian summaries pp. 171–172.]

Hygromycin B added for four to five weeks to the fodder (12,000 units per kg. food) of pigs was fully effective against *Oesophagostomum* spp. and *Ascaris lumbricoides*, particularly adult ascarids. It did not prevent lungworm infections and was of little use against *Trichuris trichiura* and *Strongyloides suis*. The gradual action of the antibiotic recommends it for prophylaxis, but it is inferior to many commonly used anthelmintics when quick relief from heavy infections is required. G. I. Pozniak

Cats and Dogs

765—BEARUP, A. J., 1960. [School of Public Health and Tropical Medicine, Sydney, Australia.] "Parasitic infection in cats in Sydney, with special reference to the occurrence of *Ollulanus tricuspis*." **Australian Veterinary Journal, 36** (8), 352–354.

From a survey of the parasites of 50 cats in Sydney *Ollulanus tricuspis*, *Aelurostrongylus abstrusus*, *Toxocara cati*, *Ancylostoma caninum*, *Dipylidium caninum*, *Spirometra erinacei*, *Taenia taeniaeformis* and *Pseudoporrorchis hydromuris* Edmonds, 1957 are recorded. The author considers that *Ollulanus* is well established in Australia. Morphological studies on his specimens show that they are intermediate between *O. tricuspis* and *O. skryabini* Burdelev, 1950 and lead the author to doubt the validity of the latter. The acanthocephalan *P. hydromuris* is a new parasite record for the cat which is probably an accidental host. W. M. Fitzsimmons

766—BRITOV, V. A., 1960. [Ribkinskaya raionnaya veterinarnaya lechebnitsa, Mariisk, ASSR, U.S.S.R.] [The distribution of *Trichinella* in the muscles.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (2), 183–186. [In Russian.]

Britov has shown experimentally that the distribution of *Trichinella* larvae in the muscles depends on the physical activity, as well as the blood supply, of the given muscles. When the left brachial artery was cut in three dogs six days after infection, the resultant infection of the affected muscles was 53% less than that of their opposites. In two dogs one of the hind limbs was strapped to a metal splint and the remaining three limbs were exercised by walking for one to one-and-a-half hours daily for two weeks. The larval infection of the working muscles with the resultant greater blood supply was 30% higher than that of the resting muscles. The effect of denervation, which gives rise to greatly enlarged vessels in the affected muscles, was studied in six dogs. In four dogs the tibial nerves of one limb were cut six days after infection and 30 to 50 days later these muscles contained two-and-a-half times as many larvae as their opposites. No such difference in infection was seen, however, in limbs denervated on the day of infection. G. I. Pozniak

767—DURRER, J. L., 1957. "Heartworm in a German shepherd kennel." **M.S.U. Veterinarian, Michigan State University, 18** (1), 56–57.

768—FITZSIMMONS, W. M., 1960. [Commonwealth Bureau of Helminthology, St. Peter's Street, St. Albans, Herts, U.K.] "Observations on the incidence, pathology and aetiology of *Spirocerca lupi* infestation in Nyasaland." **British Veterinary Journal, 116** (8), 272–275.

Three cases of malignant spirocerciasis are described, one involving rupture of the thoracic aorta, another haemorrhage into the oesophagus and a third aneurysm complicated by pregnancy. A survey in adult native dogs revealed a 100% incidence of *Spirocerca lupi* infection. Local aetiology and prophylaxis are discussed. W. M. Fitzsimmons

769—FREITAS, M. G. & LAMAS DA SILVA, J. M., 1958. [Departamento de Microbiologia e Parasitologia, Escola Superior de Veterinária, Universidade Rural, Estado de Minas Gerais, Brazil.] "Ocorrência de *Cysticercus* em cães em Minas Gerais." **Arquivos da Escola Superior de Veterinária. Universidade Rural do Estado de Minas Gerais, 11,** 371–374. [English summary p. 373.]

Cysticercus cellulosae was found in various parts of the brains of two dogs in Belo Horizonte (Brazil) and in the liver and lungs of one of the animals. The dogs had been suspected of rabies. N. Jones

770—GARDINER, M. R. & FRASER, D., 1960. [Animal Health and Nutrition Laboratory, Nedlands, Western Australia.] "Canine hookworm disease in South Western Australia." **Australian Veterinary Journal, 36** (10), 405–407.]

An outbreak of hookworm disease in a kennel of 30 hounds resulting in five deaths and caused by *Ancylostoma caninum* and *Uncinaria stenocephala* is recorded. The ecology is discussed. Clinical and post-mortem findings are described. Kidney and liver lesions are ascribed to a state of anoxia (hypoxia) existing over a period of time in these organs due to a combination of blood loss from the infection and the physical activity of the hounds during the hunting season and resulting in the accumulation of hepatic iron accompanied by chronic protein depletion within the reticulo-endothelial and hepatic cells. The biochemistry and histology of this condition are discussed in some detail. W. M. Fitzsimmons

771—HAYES, F. A. & McDANIEL, H. T., 1959. [Department of Pathology & Parasitology, School of Veterinary Medicine, University of Georgia, Athens, Georgia, U.S.A.] "An evaluation of piperazine citrate for preventing prenatal infections with the common dog ascarid (*Toxocara canis*)." **Journal of the American Veterinary Medical Association, 134** (12), 565–567.

Bitches were given doses of 5,000 eggs of *Toxocara canis* at ten-day intervals during gestation. Piperazine citrate was given to the gestating bitches daily at 200 mg. per kg. body-weight or 100 mg. per kg., or at ten-day intervals at 200 mg. per kg. No adult ascarids developed in the bitches. Ascarids which had been acquired by intra-uterine infection were unaffected and some pups started to pass eggs at three weeks of age. J. E. D. Keeling

772—KRESIN, J. W., 1957. "Microfilariae in the dog." **Auburn Veterinarian. Alabama, 13** (2), 109–115.

773—LIGGETT, J. L., 1957. "Parasitic infections causing respiratory symptoms in the dog and cat." **Auburn Veterinarian. Alabama, 13** (2), 105–109.

774—MANN, P. H., 1959. [Department of Health, Borough of Fort Lee, Bergen County, New Jersey, U.S.A.] "Determination of the anthelmintic action of anthiomaline and piperazine HCl following intravenous injections into dogs." **Cornell Veterinarian, 49** (2), 194–197.

Doses of 6 or 12 mg. per kg. body-weight of anthiomaline given daily for five days by intravenous injection failed to affect *Dirofilaria immitis* in eleven dogs. Piperazine monohydrochloride (*p*H 7·0–7·1) was given intravenously to 10 dogs. The maximum dosage employed was 100 mg. per kg. daily for five days. Little anthelmintic activity was exhibited, for at autopsy it was found that the dogs still harboured infections of hookworm, heartworm, whipworm, *Taenia* spp. and *Dipylidium* spp. J. E. D. Keeling

775—OLTEANU, G., 1960. "O metodă practică de dehelmintizare a ciinilor în echinococoză şi multiceptoză." **Probleme de Parazitologie Veterinara. Institutul de Patologie si Igiena Animala, Bucharest,** No. 8, pp. 60–66. [French & Russian summaries pp. 65–66.]

Olteanu treated 46 dogs for *Echinococcus granulosus* and *Multiceps multiceps* infections with tablets of arecoline hydrobromide. The tablets, which contained from 0·005 gm. to 0·05 gm. of the drug, were given in bread or hominy balls after a 15 to 20 hour diet. It was found that: (i) a dose of 0·002 gm. to 0·004 gm. of the drug per kg. body-weight was not toxic and did not cause any disturbance in the general conditions; (ii) the cestodes were eliminated 35 minutes to four hours after treatment; (iii) extens-efficacy of 0·002 gm. of the drug per kg. was 80% and 30% against *Multiceps* and *Echinococcus* respectively, while the intens-efficacy was 90·9% and 74·5% respectively; (iv) a dose of 0·004 gm. per kg., repeated after 45 days, had an extens-efficacy of 92·3% and an intens-efficacy of 98·3% in the case of *Multiceps*. The extens- and intens-efficacy in the case of *Echinococcus* was 61·53% and 84·61% respectively. N. Jones

776—ROHDE, K., 1959. [Parasitologischen Abteilung der Asta-Werke AG, Chemische Fabrik, Brackwede/Westfalen, West Germany.] "Vergleichende Untersuchungen über die Hakenwürmer des Hundes und der Katze und Betrachtungen über ihre Phylogenie." **Zeitschrift für Tropenmedizin und Parasitologie, 10** (4), 402–426. [English summary p. 423.]

The author's studies support the view that the cat is not a natural host for *Uncinaria stenocephala* and that the so-called cat and dog strains of *Ancylostoma caninum* are, in fact, the separate

species *A. tubaeforme* and *A. caninum* respectively. Infection experiments demonstrated that in the cat a few *A. caninum* larvae may reach the fourth stage and even the adult stage which, however, never becomes sexually mature; the same holds true for *A. tubaeforme* in the dog. In the natural hosts the prepatent period for *A. tubaeforme* is longer than for *A. caninum* and both species migrate through the lungs after subcutaneous injection of infective larvae, but after oral infection no migrations take place. In white rats lung migration occurs after oral infection with both species. Morphological studies confirm the findings of Biocca [for abstract see Helm. Abs., **23,** No. 503e] and add the information that the base of the dorsal bursal ray tends to be thinner and the incisions at its extremities deeper in *A. tubaeforme*. Distribution and sex ratio of adult *A. tubaeforme* in the cat's intestine are studied.

W. M. Fitzsimmons

777—SHORT, T. R. & HENDRICKSON, T. D., 1960. "Canine paragonimiasis in Arkansas." **Journal of the American Veterinary Medical Association, 137** (7), 417–419.

A three-month-old pup died after three days of progressive dyspnoea. Ante-mortem radiography had revealed an area of increased density dorsal and posterior to the heart shadow. Post-mortem, this was seen to be due to a cyst in the lung from which two trematodes of the genus *Paragonimus* were removed. From the ova the species was thought to be *P. westermani*. The occurrence of the first intermediate host, *Pomatiopsis lapidaria*, in Arkansas could not be confirmed by the writers but the second intermediate host (a crayfish) is plentiful. As far as the authors are able to determine, this parasite has not previously been reported in man or other animals in Arkansas.

W. M. Fitzsimmons

778—TAREEVA, A. I., 1957. [Anthelmintic effect of piperazine hexahydrate and piperazine adipate.] **Farmakologiya i Toksikologiya. Moscow, 20** (2), 59–63. [In Russian.]

Piperazine hexahydrate (gelatin capsules) in doses of 10 mg. to 200 mg. per kg. body-weight, and piperazine adipate (gelatin capsules) in doses of 12 mg. to 240 mg. per kg. freed or almost freed all the treated cats from *Toxocara mystax* infections. Laxatives were not required and both compounds were relatively non-toxic. The treatment was not effective against *Dipylidium caninum* or *Hydatigera taeniaeformis*.

G. I. Pozniak

779—VUKOVIĆ, V., 1960. [Klinika za unutrašnje bolesti domaćih životinja, Veterinarski Fakultet u Sarajevu, Sarajevo, Yugoslavia.] "Ispitivanje delovanja jedinjenja kalaja na tenijazu pasa." **Veterinaria. Sarajevo, 9** (3), 583–587. [English summary p. 583.]

Taenifuge Ercé dragées, containing 0·106 gm. of metallic tin and 0·018 gm. of stannic oxide, were given to 10 dogs with *Taenia hydatigena*. A total of 15 to 30 dragées was given during three to five days. Damaged parts of tapeworms were emitted on the second day. To test its effectiveness this treatment was followed by gastric intubation of 2 c.c. to 3 c.c. of arecoline hydrobromide, 20 gm. of Carlsbad salt and 100 c.c. of water; after this no more parts of the tapeworms were found in the faeces. 10 other dogs infected with *T. hydatigena* and *Dipylidium caninum* received a total amount of 3·75 gm. to 8·75 gm. of Cestodin, given in tablets during three to four days. After arecoline treatment proglottides of *D. caninum* were found in the faeces of three dogs.

N. Jones

780—WETTIMUNY, S. G. DE S. & ABEYSENA, F. A., 1960. [Government Veterinary Hospital, Peradeniya, Ceylon.] "Bephenium hydroxynaphthoate, 'Alcopar' (B.W. & Co.) as an anthelmintic for dogs." **Ceylon Veterinary Journal, 8** (2), 45–52.

The authors stress the need for a drug safer than tetrachlorethylene in the treatment of dogs for hookworm, particularly when the latter is not the only pathogen present. Bephenium hydroxynaphthoate at a dosage of 2 gm. irrespective of age or body-weight, administered in a gelatin capsule to reduce salivation and vomiting was very effective and safe even in cases complicated by nephritis, hepatitis, spirocercosis, distemper or gastro-enteritis. Details of 35 clinical trials are tabulated, the mode of action of the drug is described, and a brief review of the literature on bephenium is given.

W. M. Fitzsimmons

Fur-Bearing Animals

781—DUBICKI, T. & MALCZEWSKI, A., 1960. "*Crenosoma vulpis* (Dujardin, 1844, Railliet, 1915) u piesaków w woj. gdańskim." **Medycyna Weterynaryjna, 16** (8), 467–469.

Dubicki & Malczewski report on *Crenosoma vulpis* infection among 40 *Alopex lagopus* at a fox breeding farm. The most characteristic symptoms were heavy coughing, sneezing and dyspnoea. Treatment consisted of intratracheal administration of Lugol's solution, into one lung, then after 24 hours into the other, repeated after three days. The dose was 1 ml. to 2 ml. for adult and half this dose for young animals. Clinical symptoms disappeared within ten days of the beginning of treatment. Post-mortem examinations of ten animals some months later failed to reveal the presence of parasites. It is believed that *Agriolimax*, found on the lettuce which was fed to the animals, was the source of infection. N. Jones

782—USZACKA, M., 1960. [Wydział Weterynaryjny Szkoły Głównej Gospodarstwa Wiejskiego, Warszawa, Poland.] "Przypadek włośnicy u norki." **Wiadomości Parazytologiczne, 6** (2/3), 203–204. [English summary p. 204.]

Trichinella is reported in one out of 26 *Lutreola lutreola*, from a breeding farm near Warsaw, for the first time for Poland. G. I. Pozniak

Laboratory Animals

783—BEZUBIK, B. & FURMAGA, S., 1960. [Katedra Parazytologii, Wyższa Szkoła Rolnicza, Lublin, Akademicka 11, Poland.] "The parasites in *Macacus cynomolgus* L. from Indonesia." **Acta Parasitologica Polonica, 8** (8/20), 335–344. [Polish summary p. 344.]

The helminths found on examination of 60 *Macacus cynomolgus* imported from Indonesia for vaccine production were *Bertiella studeri* (cestode) and *Oesophagostomum bifurcatum*, *Trichuris trichiura*, *Streptopharagus* sp., *S. pigmentatus*, *Trypanoxyuris bipapillata*, *Characostomum asmilium* and *Physaloptera tumefaciens* (nematodes). Trematodes were absent. *M. cynomolgus* is a new host for *S. pigmentatus* and *T. bipapillata* and these two species and *O. bifurcatum* are marked as hitherto not described from Indonesia. This helminth fauna is compared with that reported from *M. rhesus* from China [for abstract see Helm. Abs., **30**, No. 88]. G. I. Pozniak

784—FAIN, A. & JANSSEN, P., 1957. [Institut de Médecine tropicale, Anvers, Belgium.] "La cénurose cérébrale expérimentale de la souris blanche par la larve de *Taenia brauni* Setti." **Bulletin de l'Académie Royale des Sciences Coloniales. Brussels.** New series, **3** (4), 876–884.

Fain & Janssen infected 25 white mice by mixing teased up proglottides of *Taenia brauni* in with their food. Eleven died before the 30th day; although tiny structureless bladders were apparent in the organs and, in four, also in the brain, no coenurus had developed. Of the 14 which survived for a sufficient length of time only one showed a coenurus in the brain; this was completely buried in a deep depression in the cerebral tissue, its upper surface covered by greatly thickened and inflamed meninges adhering to the skull. The paper is illustrated by photographs. S. Willmott

785—HSÜ, H. F. & HSÜ, S. Y., LI, 1960. [Department of Hygiene and Preventive Medicine, State University of Iowa, Iowa City, U.S.A.] "The infectivity of four geographic strains of *Schistosoma japonicum* in the rhesus monkey." **Journal of Parasitology, 46** (2), 228.

Hsü & Hsü used four strains of *Schistosoma japonicum* to infect Indian rhesus monkeys (*Macaca mulatta*). The four strains of cercariae were the Chinese from *Oncomelania hupensis* from Kashing, Chekiang, the Formosan from *O. formosa*, Changhua, Taiwan, the Japanese from *O. nosophora* from Kofu and the Philippine from *O. quadrasi* from Leyte. Seven monkeys were infected with 400 cercariae each, four were exposed to the Formosan strain and one to each of the others. Monkeys infected with the Chinese, Japanese and Philippine strains passed eggs after the 39th, 33rd and 35th days of infection respectively, but those exposed to the Formosan strain were negative after 70 days. Albino mice exposed to 200 cercariae of the Formosan strain were positive on the 42nd day of infection. Hsü & Hsü conclude that the rhesus monkey is like humans in not being susceptible to the Formosan strain of *S. japonicum*. D. L. H. Robinson

*786—KRÜGER, W., 1957. "Beiträge zur placentaren Übertragung der Trichinose bei weissen Mäusen und Ratten." **Dissertation, Berlin.**

787—LUKASHENKO, N. P., 1960. [Gelmintologicheski otdel, Institut meditsinskoi parazitologii i tropicheskoi meditsini imeni E. I. Martsinovskogo, Ministerstvo zdravookhraneniya SSSR.] [A laboratory infection as a standard of alveolar hydatid.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (2), 154–157. [In Russian: English summary p. 157.]

Lukashenko administered 60,000 to 90,000 *Echinococcus multilocularis* oncospheres directly into the stomach of each of 100 white mice, 50 white rats, four rabbits and four guinea-pigs. The oncospheres came from a *Vulpes vulpes* which had been dead for over two months under the snow in Siberia. Only the white mice were subsequently found to be infected (69%) with alveolar cysts. In 75% of the infected mice embryonic scoleces were found, whereas the others contained sterile alveolar cysts. In all cases the liver was affected. Two foxes were fed with the infected liver of one of these mice and mature *E. multilocularis* were found in the intestines of both animals two-and-a-half months after infection. The oncospheres obtained from these foxes were administered directly into the stomach of 50 *Sigmodon hispidus* and seven *Lagurus lagurus*. In 41 *S. hispidus* macroscopic lesions were first seen on the tenth day after infection and differentiated hooks were observed on the forty-third day. In all cases the cysts were localized in the liver and in one animal they also occurred in the mesentery, pancreas and spleen. Only one case of alveolar hydatid infection was observed in the liver of *L. lagurus*.

N. Jones

788—MILLEMANN, R. E. & MERGENHAGEN, E., 1960. [Department of Bacteriology, University of Rochester School of Medicine and Dentistry, Rochester, New York, U.S.A.] "Studies on the penetration of schistosome cercariae. I. Action of the antihistamine promethazine hydrochloride." **Journal of Parasitology, 46** (2), 155–163.

Millemann & Mergenhagen injected rabbits with Evans blue, histamine and bull testicular hyaluronidase and obtained the typical Evans blue response when the animals were exposed to *Schistosoma mansoni* and *Schistosomatium douthitti*. Dye accumulated at the site of penetration of the cercariae and at the site of injection of histamine and hyaluronidase. Injection of promethazine hydrochloride (an antihistamine) inhibited the reaction and in most cases the experimental animals had fewer worms than the controls. The administration of the antihistamine also inhibited to a large extent the infection of mice with *Schistosoma mansoni* and *Schistosomatium douthitti*, the effect of the drug being more marked on the former. These results are in contrast to those of Lewert & Lee (1954) [for abstract see Helm. Abs., **23,** No. 431a] on *Strongyloides ratti* and *S. simiae* larvae. The authors conclude with a discussion on the ways in which the inhibition of cercarial penetration might be brought about.

D. L. H. Robinson

789—OMURA, H., 1960. [Department of Parasitology, School of Medicine, Chiba University, Chiba, Japan.] [Studies on host-parasite relationship of the lung flukes. Experiments of transplantation of adult *Paragonimus ohirai* and *P. westermani* into the peritoneal cavities of the subcutaneous tissues of rats.] **Japanese Journal of Parasitology, 9** (3), 266–280. [In Japanese: English summary p. 280.]

One or two adult worms of *Paragonimus westermani* and *P. ohirai* were transplanted into the peritoneal cavity and subcutaneous tissues of an albino rat and a guinea-pig. Worms migrated from the peritoneal cavities to the pleural cavities in a minimum of eight days in *P. ohirai* and fourteen days in *P. westermani*. Cyst formation in the lungs was found only when two worms reached the pleural cavities at the same time. This is the first observation of cysts being produced in rat lungs by *P. westermani*. Extra-pleural cysts of both species were observed in the liver and great omentum of the rat.

Y. Yamao

790—ROHDE, K., 1959. [Parasitologische Abteilung der Asta-Werke AG., Chemische Fabrik, Brackwede/Westfalen, West Germany.] "Testierungsmethode von Filarien-Präparaten an mit *Litomosoides carinii* infizierten weissen Ratten." **Zeitschrift für Tropenmedizin und Parasitologie, 10** (4), 385–401. [English summary p. 401.]

Experiments demonstrated that the white rat is easily infected with *Litomosoides carinii* by allowing infected *Bdellonyssus bacoti* to feed on it; 204 out of 289 were successfully infected.

Microfilariae regularly appear in the blood of animals infected with adult worms of both sexes and slight eosinophilia occurs. The microfilaricidal effect of hetrazan and the macrofilaricidal action of solustibosan in both infected white and cotton-rats is similar and the growth rate of the parasites in both hosts is nearly similar. The substitution of white rats for cotton-rats as experimental animals is, therefore, feasible. W. M. Fitzsimmons

791—STOICAN, E. & LESCINSCHI, S., 1959. "*Fasciola hepatica* la cobai in regiunea Stalin." **Probleme de Parazitologie Veterinara. Institutul de Patologie si Igiena Animala, Bucharest,** No. 7, pp. 60–65. [French & Russian summaries pp. 64–65.]

Foci of *Fasciola hepatica* infection among guinea-pigs were detected in five localities of the Stalin District (Rumania) in the autumn of 1955. Epidemics destroyed 1,700 guinea-pigs in four breeding establishments and cases were found in all those examined (18). No more than seven flukes per animal were recovered post mortem in animals with severe chronic, hepatic lesions. Sexually mature *F. hepatica* from guinea-pigs were smaller (10.5 mm.) than those from other hosts. The epidemics were caused by feeding hay from flooded meadows. N. Jones

Poultry

792—COLGLAZIER, M. L., FOSTER, A. O., ENZIE, F. D. & THOMPSON, D. E., 1960. [Animal Disease and Parasite Research Division, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Maryland, U.S.A.] "The anthelmintic action of phenothiazine and piperazine against *Heterakis gallinae* and *Ascaridia galli* in chickens." **Journal of Parasitology, 46** (2), 267–270.

The efficiency of phenothiazine and piperazine, alone and in combination, against *Heterak is gallinae* and *Ascaridia galli* was tested on 72 chickens with natural single or mixed infections. Details of dosage rates and post-mortem findings are given. It is shown from the results that (i) phenothiazine exhibited only minimal action against *Ascaridia* but was very effective against *Heterakis* and the most effective dose is probably more than the commonly recommended 0.5 gm. per bird; (ii) piperazine was effective against *Ascaridia* but showed unreliable action against *Heterakis* which was not correlated with the size of the birds or the degree of infection; and (iii) that appropriate mixtures of the two drugs may prove more effective than either alone. G. I. Pozniak

793—DISSANAIKE, A. S., 1960. [Department of Parasitology, Faculty of Medicine, University of Ceylon, Colombo, Ceylon.] "*Ascaridia galli* in the hen's egg." [Correspondence.] **Ceylon Veterinary Journal, 8** (2), 65.

794—GRZYWIŃSKI, L., 1960. [Katedra Parazytologii i Chorób Inwazyjnych, Wyższa Szkoła Rolnicza, Wrocław, Norwida 27, Poland.] "Correlation between the experimental intestinal invasion and infection in poultry." **Acta Parasitologica Polonica, 8** (8/20), 255–278. [Polish summary pp. 276–277.]

Five different series of experiments on a possible inter-relationship between *Salmonella gallinarum* and *Ascaridia galli* infections in chicks showed that there was no direct correlation between fowl typhoid and the ascarid infection. G. I. Pozniak

795—GUEVARA, D. & GALDÓN, V., 1960. [Sección de Helmintología, Instituto "López-Neyra" de Parasitologia, Granada, Spain.] "Encuesta parasitológica sobre *Ascaridia galli* (Schrank) en *Gallus gallus* L. de la región granadina." **Revista Ibérica de Parasitología, 20** (3), 411–423. [English summary p. 422.]

Guevara & Galdón examined the intestines of 5,534 chickens in the area of Granada, during the period of February, 1959 to April, 1960. The examinations revealed the average incidence of *Ascaridia galli* to be about 31%. The incidence was highest in November (50%) and lowest in January (20%) and the degree of infection ranged from 1 to 191 parasites per bird, infections with one parasite being the most frequent. 35.5% of the total number of parasites were males. The incidence of infection increased in parallel with the increase in temperature, but with a delay of some three months. This delay is explained by the time taken for development. N. Jones

796—GUPTA, B. R. & RAO, S. B. V., 1959. [Poultry Research Division, I.V.R.I., Izatnagar, U.P., India.] "A preliminary note on the anthelmintic action of piperazine citrate on the large round-worm of poultry—*Ascaridia galli*, under field conditions." **Indian Veterinary Journal, 36** (10), 475–478.

The anthelmintic efficiency of Antoban (piperazine citrate) was tested in 15 chickens. Faecal egg counts and a comparison of numbers of worms expelled with those remaining at autopsy 10 days later were criteria for judging the effect of the treatment. At a dose level of 250 mg. per kg. body-weight the drug was 98.8% and 92.8% efficient against mature and immature forms of *Ascaridia galli* respectively. Cestodes were not removed by the treatment.

J. E. D. Keeling

797—KĄDZIOŁKA, A., 1960. [Katedra Anatomii Patologicznej, Wyższa Szkoła Rolnicza, Lublin, ul. Głęboka, Poland.] "Histopathological studies on the tissue test in experimental ascaridiosis of chickens." **Acta Parasitologica Polonica,** 8 (8/20), 315–334. [Polish summary pp. 332–333.]

Two groups of chickens were infected with *Ascaridia galli*; group I (aged four weeks) received 150 eggs each, group II (aged eight weeks) and with primary infections of *Heterakis gallinae* received 300 eggs each. The birds were slaughtered at daily intervals and the macroscopic and microscopic changes observed in the wall of the intestine are described. Serological tests with antigens from larvae of *A. galli*, *H. gallinae* and, for control, *Raillietina cesticillus* were not specific.

G. I. Pozniak

798—LALITHA, C. M. & ALWAR, V. S., 1960. [Madras Veterinary College, Madras, India.] "Parasites of domestic ducks (*Anas boschas domesticus*) in Madras. (A preliminary note)." **Indian Veterinary Journal, 37** (4), 179–181.

Arthropod and helminth parasites collected from 25 domestic ducks in Madras are listed. The helminths included 10 trematodes, six cestodes and eight nematodes. *Opisthorchis obsequens* Nicoll, 1914 is said to be a new record for this host. *Opisthorchis* sp., provisionally named *O. desouzai* [but not described], *Pancreatrema* sp. from the pancreas and *Capillaria* sp. from the nasal mucosa are to be studied further.

W. M. Fitzsimmons

799—MAZZOTTI, L., 1959. [Instituto de Salubridad y Enfermedades Tropicales, México, D.F., Mexico.] "Hallazgo de *Ascaridia galli* en un huevo de gallina." **Revista del Instituto de Salubridad y Enfermedades Tropicales. Mexico, 19** (1), 69–70.

800—NEGRU, D., MARICA, D., MAY, I. & JURCHIȚĂ, I., 1960. "Considerații epizootiologice și terapeutice în amidostomoza gîștelor." **Probleme de Parazitologie Veterinara. Institutul de Patologie si Igiena Animala, Bucharest,** No. 8, pp. 46–59. [French & Russian summaries pp. 57–59.]

Negru *et al.* studied the epizootiology of *Amidostomum anseris* infection in geese in the western part of Rumania in 1958. Meteorological conditions favoured the spread of the infection and its incidence reached 94.2% with a high mortality. Carbon tetrachloride, in gelatin capsules, at a dose of 1.25 ml. per kg. body-weight gave complete cures with even single treatments. The authors suggest that the birds should be treated twice, once at the end of the grazing period in the autumn, and once before the beginning of the grazing period in the spring.

N. Jones

***801**—RAUCHBACH, C. & MORARU, T., 1957. [Observations sur des cas d'acanthocéphalose chez les canards.] **Probleme Veterinare. Bucharest,** Year 1957, No. 4, pp. 44–45. [In Rumanian.]

802—ROMASHCHENKO, E. I., 1960. [Vsesoyuzni institut gelmintologii imeni akademika K. I. Skryabina, U.S.S.R.] [Filixan, a new anthelmintic against cestode infections of domestic fowls.] **Veterinariya, 37** (6), 39–41. [In Russian.]

Romashchenko tested filixan against cestode infections in 501 chickens, of which 115 served as controls. The drug was administered in food, either individually (in wheat flour balls), or in mass treatments. The doses ranged from 0.2 gm. to 3 gm. per kg. body-weight, after 12 to 15 hours' hunger diet. With a single dose of 0.5 gm. per kg. given individually, the efficacy was 100%, as checked by post-mortem examination five days after treatment. With mass treatment the birds received half of the normal food during the day and a daily dose

of 0.5 gm. per kg. was given on two to seven successive days, or doses of 1 gm. and 2 gm. per kg. were given twice at a two-day interval. The best results were obtained with the dose of 0.5 gm. per kg., given on seven consecutive days (100%). The second dose (1 gm. per kg.) gave an efficacy of 86.8% and the third (2 gm. per kg.) an efficacy of 93.7%. There were no side effects. The author discusses the incidence of cestode diseases in chickens and their prophylaxis. N. Jones

803—SAWADA, I., 1960. [Institute of Biology, Nara Gakugei University, Nara, Japan.] [The removal of chicken tapeworm, *Raillietina cesticillus* by the preparation of bithionol acetate, piperazine and phenothiazine.] **Japanese Journal of Parasitology, 9** (3), 224–226. [In Japanese: English summary p. 226.]

Tablets containing phenothiazine, piperazine and bithionol acetate were given, without starvation, to six White Leghorn chickens experimentally infected with *Raillietina cesticillus*. One tablet was about 83% effective against *R. cesticillus* and was very active in removing *Ascaridia galli*. There was no decrease in appetite, no scouring and no macroscopic variation in the intestinal organs of the chickens as a result of treatment. Y. Yamao

804—STOENESCU, V. ET AL., 1959. "Contribuţii la epizootologia prostogonimozei şi observaţii asupra tratementului." **Probleme de Parazitologie Veterinara. Institutul de Patologie si Igiena Animala, Bucharest,** No. 7, pp. 47–59. [French & Russian summaries pp. 57–59.]

The incidence of *Prosthogonimus pellucidus* infection among chickens at a State farm on the shores of Lake Snagov (Rumania) was 70% with a mortality of 4.37% in 1956. This infection appeared annually from 1948. The parasite carried a Gram-positive flora, which aggravated the process of the disease in the mucous membrane of the genital tract. Climatic conditions favoured the spread of the infection. Following different methods of treatment, it was found that egg-laying was slightly increased as a result of administration of 2 ml. to 3 ml. of carbon tetrachloride into the crop, but was somewhat reduced after 3 ml. of carbon tetrachloride given into the crop and after 0.1 gm. to 0.2 gm. of piperazine per kg. body-weight given *per os*; a slight increase in egg production was obtained by the simultaneous administration of 3 ml. of carbon tetrachloride into the cloaca and 0.1 gm. to 0.2 gm. of potassium iodide *per os*. Keeping the birds housed until 10 a.m. while the insect vector was quiescent on lucerne was the best prophylaxis. N. Jones

805—TRACH, V. N., 1957. [*Ascaridia galli* in hen's egg.] **Trudi Instituta Zoologii. Akademiya Nauk Ukrainskoi SSR, 14,** 43. [In Ukrainian: Russian summary p. 43.]

806—VELICHKIN, P. A. & DANKOV, V. G., 1957. [Feeding pumpkin to chickens to control *Ascaridia* and *Heterakis* infestation.] **Ptitsevodstvo, 7** (9), 40. [In Russian.]

807—WERDA, K., 1960. [Katedra Chorób Wewnętrznych, Wydział Weterynarii, Wyższa Szkoła Rolnicza, Lublin, Poland.] "Stosowanie pyłu tytoniowego w leczeniu glistnicy kur w warunkach terenowych." **Medycyna Weterynaryjna, 16** (7), 419.

Ascaridia galli infection in 600 chickens was treated with tobacco dust, containing 1.5% nicotine. The dust was given in the morning feed in the proportion of 1: 50 for three weeks. The ration was supplemented with carrots, lucerne, green feed and milk. At the same time the chicken houses were disinfected. Beneficial results were observed during the first week of the treatment and after four weeks the incidence of infection was reduced to 10%. N. Jones

Other Mammals

808—BROWN, D. H., McINTYRE, R. W., DELLI QUADRI, C. A. & SCHROEDER, R. J., 1960. [Marineland of the Pacific, Marineland, California, U.S.A.] "Health problems of captive dolphins and seals." **Journal of the American Veterinary Medical Association, 137** (9), 534–538.

In a report on clinical and pathological findings in dolphins and seals captive in California, the authors record severe liver damage caused by the trematode *Zalophotrema hepaticum* in an Atlantic bottle-nosed dolphin (*Tursiops truncatus*). They also record a respiratory complaint

in five harbour seals (*Phoca vitulina geronimensis*) attributed to the presence of large numbers of an unidentified filariid nematode found in the right side of the heart and in the pulmonary artery and characterized by clinical symptoms of coughing, nasal discharge and moderate dyspnoea and a post-mortem picture of diffuse pneumonitis with caseous exudate in the bronchi. W. M. Fitzsimmons

809—COCKRILL, W. R., 1960. [Food and Agricultural Organization, Rome, Italy.] "Pathology of the Cetacea. A veterinary study on whales—Part I." **British Veterinary Journal, 116** (4), 133–144.
The author lists eight known and one unknown species of helminth (cestode, nematode and acanthocephalan) from *Balaenoptera musculus*, *B. physalus*, *Megaptera nodosa* and *Physeter catodon* in the Ross Sea area. *B. musculus* is the host of an unidentified species of *Tetrabothrius*. The cestodes *Priapocephalus grandis* Nybelin, 1922 and *Tetrabothrius wilsoni* (Leiper & Atkinson, 1914) are reported from a new host, *Physeter catodon*. Observations on the extent of infection and average total lengths of helminths are recorded. No pathological effects are noted except in the case of *Crassicauda crassicauda* (Creplin, 1892) infection (kidney lesions consisting of acute and chronic tissue reactions) and *Bolbosoma hamiltoni* Baylis, 1929 infection (considerable irritation and damage to the intestinal wall) both in *Balaenoptera physalus*. In the case of *C. crassicauda* the author discusses the possibility of infection of other organs by metastasis. W. M. Fitzsimmons

810—CALLOT, J. & GAYOT, G., 1960. [Institut de Parasitologie, Fac. Méd. et Laboratoire Vétérinaire départmental, Strasbourg.] "*Cysticercus longicollis* chez des canidés." **Annales de Parasitologie Humaine et Comparée, 35** (1/2), 15–22.
Callot & Gayot report on a generalized infection of *Cysticercus longicollis* in a *Fennecus zerda* which had been in captivity for two years. An attempt to transplant some of the parasites into the scapular region and peritoneum of rabbits was not successful. The authors identify this *Cysticercus* with *C. multiformis* of Hölldobler (1937). The paper is illustrated by five figures. N. Jones

811—JASKOSKI, B. J., 1960. [Department of Biological Sciences, Loyola University, Chicago, Illinois, U.S.A.] "Physalopteran infection in an orangutan." **Journal of the American Veterinary Medical Association, 137** (5), 307.
An orang utan aged eight years nine months died from probable heart failure in the Lincoln Park Zoological Gardens. It had been in the gardens since the age of one year. A total number of 276 *Abbreviata caucasica* von Linstow, 1902 was recovered from the oesophagus, trachea and stomach. Faecal samples taken before death had not revealed the presence of the infection. W. M. Fitzsimmons

812—JASKOSKI, B. J., 1960. [Department of Biological Sciences, Loyola University, Chicago, Illinois, U.S.A.] "Physalopterid infections in the capybara." **Journal of the American Veterinary Medical Association, 137** (9), 539.
Abbreviata africana is recorded from the stomach of two capybaras (*Hydrochoerus hydrochoerus*) which died after 28 and 29 months in Lincoln Park Zoological Gardens, U.S.A., where they were received at the age of three months. The author believes this to be the first record of a physalopterid from this host in the western hemisphere. W. M. Fitzsimmons

813—McEWIN, B., 1957. [University of Adelaide, South Australia.] "Cestodes from mammals." **Report Series, B.A.N.Z. Antarctic Research Expedition, 6B** (4), 75–90.
McEwin records six species of diphyllobothriid pseudophyllid tapeworms from aquatic mammals. She gives a detailed description with figures, list of synonyms and previous records of: *Diphyllobothrium mobile* (Rennie & Reid, 1912) and *D. lashleyi* (Leiper & Atkinson, 1914) from *Leptonychotes weddelli*, the Weddell seal; *Diphyllobothrium quadratum* (Linstow, 1892) and *D. scoticum* (Rennie & Reid, 1912) from *Hydrurga leptonyx*, the sea leopard; *Glandicephalus perfiolatus* (Railliet & Henry, 1912) and *G. perfiolatus* var. *rufus* (Leiper & Atkinson, 1914) from the Weddell seal. An immature *Diphyllobothrium* species is recorded from the sea elephant, *Mirounga leonina*. J. Mahon

814—MAMEDOV, M. M., 1960. [Institut meditsinskoi parazitologii i tropicheskoi meditsini imeni Martinovskogo, Ministerstvo zdravookhraneniya SSSR, Moscow.] [Natural foci of alveolar hydatid in the Turukhansk district of the Krasnoyarsk territory.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (2), 157–161. [In Russian.]

Of 63 hydatid cases operated on within the last three years in the Krasnoyarsk territory, 54 were of the alveolar type and of these six originated from the northern Turukhansk district. This district is a natural focus of alveolar hydatidosis; the adult worms were found in 20 of 50 arctic foxes and one of 33 dogs, and the larvae in three of seven *Microtus oeconomus*.

G. I. Pozniak

815—OSWALD, V. H., 1958. [Department of Zoology and Entomology, Ohio State University, Columbus 10, Ohio, U.S.A.] "Helminth parasites of the short-tailed shrew in central Ohio." **Ohio Journal of Science, 58** (6), 325–334.

The following are recorded from 78 out of 93 *Blarina brevicauda* examined in Ohio: the cestodes *Hymenolepis anthocephalus*, *H. blarinae*, *Pseudodiorchis reynoldsi*, *Protogynella blarinae* and *P. pauciova*; the trematodes *Entosiphonus thompsoni*, *Brachylaima rhomboideus* and *Panopistus pricei*; the nematodes *Parastrongyloides winchesi*, *Longistriata depressa*, *Angiostrongylus blarini*, *Physaloptera limbata*, *Capillaria blarinae* and larval *Porrocaecum americanum*, *P. encapsulatum* and *P. ensicaudatum*; and the acanthocephalan *Centrorhynchus conspectus* (cystacanth). Some characters are given for a fluke and a tapeworm which appear to be new species but the material did not permit a sufficiently detailed study of either worm. *Parastrongyloides winchesi*, *C. conspectus* and *Porrocaecum ensicaudatum* represent new host records, the last appearing to be an accidental infection. *Ectosiphonus ovatus* and *B. condylura* are shown to be synonyms of *B. rhomboideus*, and *Ectosiphonus* must now be considered synonymous with *Brachylaima*. The fauna is discussed in relation to the feeding habits of the shrew.

G. I. Pozniak

816—RITCEY, R. W. & EDWARDS, R. Y., 1958. [Department of Recreation & Conservation, Victoria, British Columbia, Canada.] "Parasites and diseases of the Wells Gray moose herd." **Journal of Mammalogy, 39** (1), 139–145.

Post-mortem examinations of 34 moose in British Columbia revealed the presence of *Cysticercus tenuicollis* in 84%, *Cysticercus* sp. (probably *C. krabbei* or *C. ovis*) in two animals, hydatid cysts in 68% and *Wehrdikmansia cervipedis* in 95% (out of 27 examined), N. Jones

817—ROBINSON, Jr., E. J., 1959. [Department of Biology, Kenyon College, Gambier, Ohio, U.S.A.] "New hosts for *Hasstilesia tricolor* and *H. texensis* (Trematoda: Brachylaimidae), and an emended diagnosis for the latter." **Transactions of the American Microscopical Society, 78** (3), 317–322.

14 specimens of *Hasstilesia tricolor* were recovered for the first time from the small intestine of *Vulpes fulva* in Ohio. They were larger, on average, but had smaller ovaries than those collected from *Sylvilagus floridanus mallurus* in New York State. It is suggested that the fox might have been infected by ingesting adult flukes. *H. texensis* were found in two specimens of *S. palustris palustris* in Georgia, which is also a new host record. It has been found that the most useful characteristics of *H. texensis*, differentiating it from *H. tricolor*, are: (i) the larger size of the muscular organs relative to the body size; (ii) the more posterior position of the acetabulum; and (iii) the greater maximum extent of the vitellaria. The last two characteristics are variable and should not be used unless sufficient specimens are available for statistical treatment. The author modifies the specific diagnoses for *H. texensis* as given by Chandler and by Byrd & Reiber. N. Jones

818—STOICAN, E. & OLTEANU, G., 1959. "Contribuţii la studiul helmintofaunei căprioarei (*Capreolus capreolus*) in R.P.R." **Probleme de Parazitologie Veterinara. Institutul de Patologie si Igiena Animala, Bucharest,** No. 7, pp. 38–46. [French & Russian summaries pp. 45–46.]

Stoican & Olteanu examined post mortem seven *Capreolus capreolus* during 1954–57. The incidence of helminths was *Dicrocoelium dendriticum* 14%, *Fasciola hepatica* 28.5%, *Moniezia benedeni* 42.8%, *Trichostrongylus colubriformis* 57%, *Haemonchus contortus* 42.5%, *Nematodirus filicollis* 100%, *Dictyocaulus eckerti* 28.5%, *Setaria* sp. 57%, *Gongylonema pulchrum* 42.8%. Seven of the species are common in Rumania in roe-deer and domestic animals but *Dictyocaulus eckerti* and *Setaria* sp. are rare. N. Jones

819—VOGE, M. & DÍAZ-UNGRÍA, C., 1959. "Cestodes de Venezuela—VII. Cestodes de roedores venezolanos." **Boletín del Instituto de Investigaciones Veterinarias. Caracas,** Year 1958–59, **10/11** (26), 57–68.

Voge & Díaz-Ungría report new host records for Venezuela, viz., larvae of *Taenia taeniaeformis* (Batsch, 1786) from the rodents *Neocomys spinosus* and *Sigmodon hispidus hirsutus*, and *Hymenolepis diminuta* (Rud., 1819) from *S. hispidus hirsutus* and *Zigodontomys brevicauda*. *H. nana* (v. Siebold, 1852) is reported from *Rattus norvegicus*. 34 specimens assigned to *Raillietina demarariensis* (Daniels, 1895) were collected from *Rattus norvegicus*, *S. hispidus hirsutus*, *N. spinosus* and *Proechimys* sp. The large number of specimens gives a wider range of individual variation and the measurements overlap those given by Stunkard for *Raillietina demerariensis* and by Chandler for *R. bakeri* from *Sciurus niger*, which itself is very close to *R. loechesavalezi*. The only way of solving the problems of classification of the *Hymenolepis* of mammals is by a study of the life-cycles and comparison of the larval stages. There are ten figures, one table and four references. J. Mahon

820—ŻARNOWSKI, E., 1960. [Katedra Parazytologii, Wyższa Szkoła Rolnicza, Lublin, Akademicka 11, Poland.] "Parasitic worms of forest micromammalians (Rodentia and Insectivora) of the environment of Puławy (district Lublin). II. Trematoda." **Acta Parasitologica Polonica,** 8 (8/20), 127–168. [Polish summary p. 168.]

The following trematodes were found in ten species of rodents and four of insectivores in the Puławy area: *Plagiorchis stefański* in *Apodemus agrarius*; *Brachylaemus fulvus*, *Opisthioglyphe exasperatum*, *O. opisthovitellinus* and *Dicrocoelium* sp. in *Sorex araneus*; *O. exasperatum* in *S. minutus* and *Crocidura leucodon*; and *O. locellus* and *Metorchis albidus* forma *minor* in *Neomys fodiens* [see also abstract of a preliminary note in Helm. Abs., **25,** No. 890cp]. Żarnowski gives descriptions of these species and discusses the systematics of Brachylaemidae, the position of genera in Brachylaeminae, the specific composition of *Plagiorchis*, and the generic composition of Opisthioglyphinae and its species. He proposes keys to the three tribes of Brachylaeminae, to the genera of Brachylaemea, to the genera of Opisthioglyphinae, and to the subgenera of *Opisthioglyphe*. [For abstract of a paper on the cestode fauna of these hosts in the Puławy area see Helm. Abs., **25,** No. 44a.] G. I. Pozniak

Other Birds

821—KASIMOV, G. B., 1960. [Institut zoologii, Akademiya nauk Azerbaidzhanskoi SSR, Baku, U.S.S.R.] [Some data on the helminth fauna of birds of the family Pavonidae.] **Zoologicheski Zhurnal, 39** (8), 1261–1262. [In Russian: English summary p. 1262.]

Kasimov considers the helminth fauna numbering over 200 species from 59 species of Pavonidae (over a third of the pavonid birds known). The most important of the 125 helminths which are specific to this family are in the genera *Heterakis*—16 species, *Ganguleterakis*—12 species, *Subulura*—17 species, *Ascaridia*—nine species, *Raillietina*—26 species, *Rhabdometra*—three species and *Cotugnia*—five species. G. I. Pozniak

822—SAWADA, I., 1960. [Biological Laboratory, Nara Gakugei University, Nara, Japan.] "*Raillietina* (*Raillietina*) *tokyoensis* n.sp. from a domestic pigeon, *Columba livia domestica*." **Annotationes Zoologicae Japonenses, 33** (1), 57–60.

Sawada reports a new tapeworm from a domestic pigeon, *Columba livia domestica*, in Tokyo, Japan, and names it *Raillietina* (*Raillietina*) *tokyoensis* n.sp. It has a strong resemblance to *R.* (*R.*) *tunetensis* described by Joyeux & Houdemer, 1927, but differs in the position of its genital pore, in the number of rostellar hooks and testes, and in having smaller suckers. Y. Yamao

823—STOICAN, E., 1960. "Contribuţii la studiul helmintofaunei ciorii de semănătură (*Corvus frugilegus*) din R.P.R." **Probleme de Parazitologie Veterinara. Institutul de Patologie si Igiena Animala, Bucharest,** No. 8, pp. 67–74. [French & Russian summaries pp. 73–74.]

Stoican examined post mortem 59 specimens of *Corvus frugilegus* and found the incidence of *Eucoleus corvicola* to be 75.5%, *Microtetrameres* sp. 61%, *Acuaria* sp. 55% and *Capillaria*

corvorum 5%. Hymenolepididae were found in 44% of the birds. It is mentioned that literature does not report on the presence of *E. corvicola* in *Corvus frugilegus*. Embryonated eggs of *Capillaria corvorum* were obtained after 12 days' incubation of the intestinal contents of an infected crow at 18°C. to 26°C. Three out of five chickens which received this egg culture eliminated *Capillaria* eggs after 45 days and 75 days after infection these eggs were found in the faeces of all five birds. The paper is illustrated with numerous photomicrographs and diagrams. N. Jones

824—STOROZHEVA, A. M., 1957. [Seasonal dynamics of the principal helminth infections of waterfowl and their prevention.] **Ptitsevodstvo, 7** (8), 37–39. [In Russian.]

Reptiles and Amphibia

825—CABALLERO RODRÍGUEZ, G., 1960. [Departamento de Biologia, Universidad Nacional Autonoma de México, Facultad de Ciencias, Mexico.] "Estudio de tremátodos digéneos de algunas tortugas comestibles de México." **Thesis, Universidad Nacional Autónoma de México,** 69 pp.

A *Chelone mydas*, captured in the waters of Acapulco in 1957, was found to harbour the following trematodes in the small intestine: *Rhytidodes gelatinosus*, *Adenogaster serialis*, *Endiotrema megachondrus*, *Pachypsolus brachus* and *Cymatocarpus undulatus*. One specimen of *Dermatemys mawii*, captured in 1959 (in fresh water) harboured *Pseudocleptodiscus bravoae* Caballero, 1960 (one specimen), *Dermatemytrema trifoliata*, *Schizamphistomoides tabascenis*, *S. resupinatus*, *Octangioides skrjabini* and *Choanophorus rovirosai* in the intestinal tract. The parasites are described in detail and figured. N. Jones

826—ELKAN, E., 1960. [Group 9, Pathological Laboratory, Watford, Herts, U.K.] "Some interesting pathological cases in amphibians." **Proceedings of the Zoological Society of London, 134** (2), 275–296.

In *Xenopus laevis* trematodes were found in the gall-bladder and the Wolffian duct and the lateral line system was fatally affected with a larval trematode infection. *Cephalochlamys namaquensis* (Dibothriocephalidae) in newly imported specimens were ejected after the injection of a urinary extract in the course of pregnancy tests; it is thought that the Brom-Phenol indicator acts as a vermifuge. Unidentified "worms" are held responsible for adhesions and inflammation of the intestines. In *Pipa pipa* intestinal cysts contain nematode larvae. The refusal of the host to feed is ascribed to their presence. In *Bufo bufo* infection and injury by *Acanthocephalus ranae* together with the additional infection by *Nematotaenia dispar* and *Rhabdias bufonis* is held responsible for death. In *Hynobius lichenatus* a nematode infection of the kidney occurred and in *Sirenia lacertina* trematode cercariae were encysted in the liver. W. M. Fitzsimmons

827—GRANT, J. S., 1958. [District Forest Office, Kluang, Johore, Malaya.] "An experiment with leeches." [Correspondence.] **Malayan Nature Journal, 13** (1), 31.

Grant placed two specimens of *Dinobdella* sp. with a male *Bufo melanosticus* which died within 48 hours. A second toad also died within 48 hours and the leeches died soon after. On dissection, the gorged leeches were found to be filled with the toads' blood which had coagulated, thus causing their death. N. Jones

828—JASKOSKI, B. J., 1960. [Department of Biological Sciences, Loyola University, Chicago, Illinois, U.S.A.] "Heavy parasitic infection in an Egyptian cobra—a case report." **Journal of the American Veterinary Medical Association, 137** (5), 296.

Jaskoski records the nematodes *Polydelphis najae*, *Hexametra quadricornis* and *Kalicephalus parvus* and the pentastome *Armillifer annulatus* from the Egyptian cobra (*Naja haje*). W. M. Fitzsimmons

829—KOZŁOWSKA, J., 1960. [Instytut Zoologiczny Polskiej Akademii Nauk, Łódź, Park Sienkiewicza, Poland.] "On the nematodes of amphibians of Poland, mainly from the environment of Łódź." **Acta Parasitologica Polonica, 8** (8/20), 215–230. [Polish summary p. 230.]

The 12 nematode species found in 707 amphibians from near Łódź and four other localities in Poland included *Oxysomatium brumpti*, *Oswaldocruzia bialata*, *O. molgeta*, *Thominx costacruzi* and *T. filiformis*, which are reported for the first time from that country. Tabulated data give the rates of infection of the 11 host species, the rates of infection with individual nematodes of each host type, and a list of all the nematode species hitherto recorded from Amphibia in Poland. As the specimens of *Oxysomatium brumpti* differed somewhat from the original description by Travassos in 1931, additional morphological data are given for this species.

G. I. Pozniak

Miscellaneous

830—DALLING, T., 1960. [FAO, Rome.] "Parasitic infestations of animals." **East African Agricultural and Forestry Journal, 26** (1), 56–64.

831—DRÓŻDŻ, J., CHOWANIEC, W. & WERTEJUK, M., 1960. [Katedra Parazytologii i Chorób Inwazyjnych, Inst. Wet., Puławy, Poland.] "Specyfika walki z motylicą wątrobową w zależności od lokalnych warunków środowiskowych." **Medycyna Weterynaryjna, 16** (1), 19–21. [English & Russian summaries p. 21.]

Dróżdż *et al.* point out in their discussion of the control of fascioliasis that it should be preceded by investigations of the environment and adapted to the latter. The authors subdivide such areas into three principal types, (i) periodically inundated areas, (ii) plain areas with local *Galba truncatula*, far from rivers and streams and (iii) dry areas, unsuitable for the snail, but periodically infested with metacercariae through violent flooding of nearby rivers and streams.

N. Jones

832—DUNN, A. M., 1960. [University of Glasgow, Department of Veterinary Pathology, The Veterinary School, 85, Buccleuch Street, Glasgow, C.3, Scotland, U.K.] "*Teladorsagia davtiani* in British sheep." [Correspondence.] **Veterinary Record, 72** (49), 1134.

Commenting on Rose's letter [for abstract see No. 747 above], Dunn reports *Teladorsagia davtiani* in sheep in most of the mainland counties of Scotland and the Hebrides. He also records it from the roe deer (*Capreolus capreolus*) in Scotland, which is a new host record. He did not note the wing reported for this species by Andreeva & Satubaldin (in Skryabin, Shikhobalova & Shults, "Principles of Nematodology". Vol. III). He considers it unlikely that *Teladorsagia* will achieve permanent generic status since there are several subgenera of *Ostertagia* with more substantial morphological claims to this than those put forward for *Teladorsagia*.

W. M. Fitzsimmons

***833**—EMANUILOV, I., 1958. [Studies on the relationship between bacteria and Ascaris in intestinal parasitocoenosis in swine and horses.] **Izvestiya na Mikrobiologicheskiya Institut. Sofia, 9,** 61–71. [In Bulgarian.]

834—FIENNES, R. N. T. W., 1960. "Report of the Society's Pathologist for the year 1958." **Proceedings of the Zoological Society of London, 134** (2), 297–308.

Among 305 clinical specimens from living mammals, nine cestodes from Carnivora, three nematodes from Primates, 39 from Carnivora and two from Artiodactyla were diagnosed. Of 763 deaths in all classes those of parasitic origin [not, presumably, exclusively helminths] were Mammalia (Marsupial) one, Aves two, Reptilia nine, Batrachia one. Helminths identified from post-mortem specimens were: Mammalia—three cestodes and two nematodes; Aves—two cestodes and seven (one filarial) nematodes; Reptilia—seven cestodes and 17 nematodes; Batrachia—two nematodes. In the Mammalia one cestode each came from Primates, Artiodactyla and Marsupiala, and one nematode each from Carnivora and Artiodactyla. In 94 faecal samples from 71 snakes, 17 were positive for helminths.

W. M. Fitzsimmons

835—GIBSON, T. E., 1960. [Central Veterinary Laboratory, New Haw, Weybridge, Surrey, U.K.] "*Toxocara canis* as a hazard to public health." **Veterinary Record, 72** (38), 772–774.
Gibson reviews the literature which has a bearing upon visceral larva migrans in man and domestic animals caused by *Toxocara canis*. He stresses the important aetiological factors and makes recommendations for prophylactic measures. The particular danger from the faeces of puppies and nursing bitches is pointed out and the need for treatment of puppies before prenatal infections become patent is emphasized. W. M. Fitzsimmons

836—GINTAUTAS, A., ET AL., 1960. [Organization of the control of helminths in the Kovarsk district of Lithuanian S.S.R.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (2), 149–153. [In Russian.]
The organization is described of an anti-helminth campaign in the live-stock farming Kovarsk district of Lithuania. The campaign involves the instruction of the population, including schoolchildren, in hygiene and infectious diseases, the cleansing of houses, work premises and animal sheds and yards, appropriate food and meat hygiene measures, control of rodents and instalment of fines for non-compliance with the introduced regulations. G. I. Pozniak

***837**—GORYANOVA, Z. S., 1957. [The use of a ruminograph in the diagnosis of a cryptic form of fascioliasis.] **Uchenie Zapiski Vitebskogo Veterinarnogo Instituta, 15,** 74–78. [In Russian.]

838—GRUJIĆ, I., 1960. [Centralan higijenski zavod, Sarajevo, Yugoslavia.] "Humana tenijaza i cisticerkoza svinja i goveda." **Veterinaria. Sarajevo, 9** (1), 109–117. [English summary p. 109.]
Grujić concludes, on the basis of data from different regions and institutions, that in Bosnia and Hercegovina about 300,000 people have taeniasis and that cysticerciasis is present in about 10% of cattle and 6% of pigs. The ratio of the incidence of *Taenia solium* to that of *T. saginata* is 1: 20. This can be explained by the fact that the Moslem population do not eat pork and by the common habit of eating half-raw beef. The author discusses possible control methods. N. Jones

839—HAIBA, M. H. & SELIM, M. K., 1960. [Department of Parasitology, Faculty of Veterinary Medicine, Giza, Egypt.] "A comparative preliminary biochemical study on the effect of *Fasciola* infestation in bile and serum of Egyptian buffaloes, cows and sheep." **Zeitschrift für Parasitenkunde, 19** (6), 535–540.
The study of morphological differences in *Fasciola* species from buffaloes, cattle and sheep was extended to a study of differences in pathological effects on bile and serum of the host. These included changes in specific gravity, water content, total solids, total organic matter and inorganic matter in bile and serum; the serum study also including total proteins and the albumin/globulin ratio. Tables give these values in the three host species infected with *Fasciola*, comparing them with normal values determined by the authors. Differences in the degree of abnormality between the three host species are said to be sufficiently significant to support previous conclusions on morphological differences [see abstract No. 1102 below]. T. J. Coyle

***840**—HEUCK, P., 1957. "Der Parasitenbefall der Haustiere im Kreis Tölz mit bes. Berücksichtigung der Offen- und Tiefstallungen." **Dissertation, Munich,** 73 pp.

841—JASKOSKI, B. J. & KRZEMINSKI, W., 1960. [Department of Biological Sciences, Loyola University, Chicago, Illinois, U.S.A.] "Incidence and treatment of parasites in a Zoological Garden." **American Journal of Veterinary Research, 21** (83), 631–635.
An incidence of 13% parasitic infection was found in a survey of 391 animals at Lincoln Park Zoological Gardens and the Indian Boundary Zoo, Chicago. A variety of monkeys and apes carried *Trichuris* and *Strongyloides*, larger and smaller felines carried *Toxocara*. Bears were infected with *Ascaris transfuga*, a zebra with *Parascaris equorum*, a Bactrian camel with *Strongyloides*, an African porcupine with *Wellcomia evoluta*, and an Algerian hedgehog with *Trichuris*. Piperazine adipate was well tolerated and had an efficacy of 72%. Dithiazanine iodide gave side reactions of diarrhoea and vomiting in some cases and was 66% effective. Evaluation of a coated preparation of hexylresorcinol as an anthelmintic was inconclusive due to the development of diarrhoea and vomiting in the puma (*Felis concolor*). W. M. Fitzsimmons

842—KUSUNOKI, M. ET AL., 1960. [Department of Oda Internal Medicine, Medical School, Osaka City University, Osaka, Japan.] [Experimental studies on the transference of dog hookworm into cat or rabbit muscles.] **Japanese Journal of Parasitology, 9** (1), 72–75. [In Japanese: English summary p. 53.]
30 adult hookworms, *Ancylostoma caninum*, were transferred into the muscles of cats. 50% of them survived 14 days in this habitat. 6·6% of young adults and 17·5% of fourth-stage larvae in the same circumstances survived 14 days and 7 days respectively. In the fourth-stage larvae, formation of an oral capsule and development of ventral teeth were observed. By contrast, hookworms transferred into the muscles of rabbits were not detectable on the third day.
Y. Yamao

843—LAMAS, J. M., MACHADO, A. V. & RANGEL, N. M., 1958. [Departamento de Patologia, Escola Superior de Veterinária, Universidade Rural, Estado de Minas Gerais, Brazil.] "IV—Notas estatísticas de anatomia patológica veterinária em Minas Gerais." **Arquivos da Escola Superior de Veterinária. Universidade Rural do Estado de Minas Gerais, 11,** 93–112.

*844—LEE, Y. C. ET AL., 1957. [Investigation on the internal parasites of domestic animals in Taiwan.] **Journal of the Agricultural Association of China,** No. 19, pp. 45–67. [In Chinese: English summary.]

845—LUKASHENKO, N. P & BRZHESKI, V. V., 1959. [Otdel gelmintologii, Institut malyarii, meditsinskoi parazitologii i gelmintologii, Ministerstvo zdravookhraneniya SSSR.] [The natural foci of trichinelliasis in the Barabinsk forest-steppe of the Novosibirsk region.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 28** (4), 415–418. [In Russian.]
Foci of trichinelliasis were found in the Barabinsk, Kuybyshev, Chany and Tatarsk areas of the Barabinsk forest-steppe. 33 of 162 wild foxes, one wolf, two of 42 *Mustela erminea*, one of 11 *M. sibirica* and one of nine silver-black foxes were infected. 11 dogs were free of infection.
G. I. Pozniak

846—MAGLAJLIĆ, E., OŽEGOVIĆ, L. & TURANČIĆ, V., 1960. [Klinika za unutarnje bolesti domaćih životinja, Veterinarski Fakultet, Univerzitet u Sarajevu, Sarajevo, Yugoslavia.] "Pregled unutarnjih oboljenja kopitara i mesojeda (od 1.1.1953 do 1.VI. 1960). Prilog poznavanju patologije kopitara i mesojeda." [A survey of internal diseases in horse and carnivorous animals. A contribution to the knowledge of pathology in horse and carnivorous animals.] **Veterinaria. Sarajevo, 9** (3), 535–540. [English summary p. 535.]

*847—MUREAU, G., 1957. "Cycle biologique des trichostrongylides des ruminants domestiques. Conséquences prophylactiques." **Thesis, Alfort,** 96 pp.

848—MYERS, B. J., WOLFGANG, R. W. & KUNTZ, R. E., 1960. [Institute of Parasitology, McGill University, Macdonald College P.O., Que., Canada.] "Helminth parasites from vertebrates taken in the Sudan (East Africa)." **Canadian Journal of Zoology, 38** (4), 833–836.
A list of trematodes, cestodes and nematodes collected from vertebrates in the Sudan (East Africa) is given. 90 animals representing 27 species were examined. The present paper catalogues one of the several large collections made by the United States Navy in Africa in the Middle East.
M. Beverley-Burton

*849—NEMESÉRI, L. & HOLLÓ, F., 1957. "Állatorvosi parazitólogiai diagnosztika." [Diagnosis of parasites of domestic animals.] **Budapest: Mezogazdasági Kiado,** 247 pp.

850—NENOW, S., 1960. "Występowanie bąblowców (*Echinococcus*) w Bułgarii." **Wiadomości Parazytologiczne, 6** (1), 31–40. [English summary p. 40.]
This review of the literature on echinococcosis in Bulgaria shows that it is frequent and widespread throughout the country. 16% of town dogs and 40% of rural dogs are infected and the average rate of infection for slaughtered animals is 50% to 70%. In man, about 350 cases are treated annually; alveolar hydatid is, however, infrequent. The localization of the cysts is discussed.
G. I. Pozniak

851—NOSIK, A. F., LITVISHKO, N. T. & GOLUBOV, V. N., 1959. [Kafedra parazitologii, zoologii i darvinizma, Kharkovski veterinarni institut, U.S.S.R.] [The epizootiology of trichinelliasis.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 28** (4), 411–413. [In Russian: English summary p. 413.]

Trichinella larvae were found in the following animals examined during 1955–56 in the Kharkov area: in all of nine wolves, in eight of 17 foxes, in two of 14 dogs, in one of three cats, in four of 33 grey rats and in two of 17 field-mice. Larvae were also found on seven of 12 wolf hides, on four of 23 fox hides and on one raccoon hide. G. I. Pozniak

***852**—RAUCHBACH, C., 1957. [L'existence des anoplocéphalidés *Moniezia trigonophora* et *Moniezia denticulata* chez les ruminants de la République Populaire Roumaine.] **Probleme Veterinare. Bucharest,** Year 1957, No. 5, pp. 14–18. [In Rumanian: French summary.]

853—RUKAVINA, J. & DELIĆ, S., 1960. [Zavod za parasitologiju i invazione bolesti, Veterinarski Fakultet, Univerzitet u Sarajevu, Sarajevo, Yugoslavia.] "Nekoliko podataka o trihinelozi divljih i domaćih karnivora i drugih životinja za period od 1958–1960 god. u Bosni i Hercegovini." **Veterinaria. Sarajevo, 9** (3), 589–591. [English summary p. 589.]

72 dogs, 10 domestic and one wild cat, 49 domestic and 5 wild pigs, one badger, 55 foxes, three martens, four wolves, one bear and one rat were examined for trichinelliasis in Bosnia and Hercegovina during 1958–60. Four dogs, one domestic pig, nine foxes and four wolves were found to be infected. The number of *Trichinella spiralis* larvae detected after artificial digestion ranged from 2 to 28 per 10 gm. of muscle. N. Jones

854—SIRIGU, A., 1960. "Contributo al trattamento della broncopolmonite verminosa dei bovini e delle pecore con la cianacetidrazide." **Clinica Veterinaria. Milan, 83** (2), 39–44.

Sirigu treated verminous broncho-pneumonia in 12 calves with 22·5% cyanacethydrazide solution at a single, or repeated, average dose of 15 mg. per kg. body-weight. The treatment resulted in improvement of general condition and disappearance of the cough. The drug was given intramuscularly and was well tolerated. Similar results were obtained in other calves and in some lambs. The lambs were treated with 2 c.c. of the solution per head. This dose applied in single treatments to other sheep and lambs, failed to produce good results.
N. Jones

***855**—SUPPERER, R., 1957. "Parasitenbefall und parasitäre Erkrankungen." **Österreichische Kleintierzüchter, 12** (6), 69–71.

***856**—SUSLINA, M. V., 1957. [Reactions in the lymphatic nodes of animals accompanying the migration of ascarid larvae.] **Uchenie Zapiski. Gorkovski Meditsinski Institut,** Year 1957, No. 1, pp.57–71. [In Russian.]

857—URQUHART, G. M., HAY, D., ZAPHIRO, D. R. P. & SPINAGE, C. A., 1960. [East African Veterinary Research Organization, Muguga, Kenya.] "Some internal parasites of game animals in Kenya." **East African Agricultural and Forestry Journal, 26** (1), 11–20.

In this paper, written for those who are concerned with wild-life preservation but not specialized in parasitology, the authors deal mainly with insect and helminth parasites of zebra (*Equus burchellii*), wildebeest (*Gorgon taurinus*), Grant's gazelle (*Gazella granti*) and Thomson's gazelle (*G. thomsoni*) in Kenya. The common helminth parasites of these animals are described and notes are added on the sites in which they are found and their possible economic importance and life-history. Advice to collectors on labelling is given and they are referred to a booklet on preservation methods obtainable from the East African Veterinary Research Organization, Muguga, Kenya. The interest and value of, and great need for further research on, parasites of game animals is emphasized. Photographs illustrate the paper.
W. M. Fitzsimmons

***858**—VELLA, G., 1957. "L'echinococcose en Algérie. Essais de traitement du kyste hydatique." **Thesis, Alfort,** 47 pp.

***859**—WILLEMART, J. P., 1957. "Contribution à l'étude de l'influence des carences alimentaires sur les grandes parasitoses de herbivores domestiques en Afrique." **Thesis, Alfort,** 70 pp.

FISHERIES HELMINTHOLOGY

Fresh-Water Fisheries

860—BHOWMICK, R. M., 1960. [Central Inland Fisheries Research Station, Barrackpore (24 Parganas).] "On the occurrence of strigeid metacercariae in the cranial cavity of the Indian goby *Glossogobius giuris* (Hamilton)." [Correspondence.] **Science and Culture. Calcutta, 25** (7), 442–443.

Bhowmick records the occurrence of metacercariae of a strigeid trematode of the subfamily Polycotylinae in the cranial cavity of the fish *Glossogobius giuris* at the gobeid fisheries of Hooghly and Maltah estuaries, Padma river (West Bengal) and Mahanadi (Orissa). The length frequency of the specimens of fish examined and the percentage of parasitism observed are detailed in a graph. No pathogenic effects were observed. M. M. Sarwar

861—ERGENS, R., 1960. [Biologický ústav ČSAV, parasitologie, Praha, Czechoslovakia.] "*Skrjabillanus* Schigin et Schigina 1958, nový rod cizopasných hlistic (Camallanata Chitwood 1936) pro faunu ČSR." **Věstník Československé Zoologické Společnosti, 24** (3), 230–231. [German summary p. 231.]

Ergens has found four specimens of *Skrjabillanus tincae* in the body cavity of a *Tinca tinca* caught in the Svratka river, in the surroundings of Brno. This is the first report of this nematode genus in Czechoslovakia. N. Jones

862—MALEVITSKAYA, M. A., 1958. [Ukrainski nauchno-issledovatelski institut ribnogo khozyaistva, U.S.S.R.] [The introduction of a parasite with a complex life-cycle, *Bothriocephalus gowkongensis* Yen, 1955, during acclimatization of fish from the Amur river.] **Dokladi Akademii Nauk SSSR, 123** (3), 572–575. [In Russian.]

Bothriocephalus gowkongensis has been recovered from the anterior part of the intestine of young *Cyprinus carpio*. The carp had been brought from a pond in the Kiev region and it is believed that the parasite, not hitherto reported from carp, has been introduced into the pond with the young of *Ctenopharyngodon idella* and *Hypophthalmichthys molitrix* from the Amur river. N. Jones

863—RADWAN, S., 1960. [Katedra Parazytologii, Wyższa Szkoła Rolnicza, Lublin, Akademicka 11, Poland.] "Helminth parasites of unbred fishes in a pond husbandry." **Acta Parasitologica Polonica, 8** (8/20), 289–297. [Polish summary p. 297.]

The helminths found in 136 *Leuciscus idus*, *Leucaspius delineatus* and *Rutilus rutilus* (non-economic fish also living in carp ponds) from Siemień pond near Lublin were: *Sphaerostomum bramae*, *S. globiporum*, *Tylodelphys clavata* (metacercaria), *Diplostomum* sp. (metacercaria), *Caryophyllaeides fennica*, *Schistocephalus solidus* (plerocercoid), *Raphidascaris acus* (larva) and *Acanthocephalus anguillae*. *S. solidus* is reported for the first time from Cyprinidae (*Leuciscus idus* and *Leucaspius delineatus*). Most of these helminths also parasitize carp.
G. I. Pozniak

864—SIDOROV, E. G., 1960. [Institut zoologii, Akademiya nauk, Kazakhskaya SSR, U.S.S.R.] [The distribution of metacercariae of *Opisthorchis felineus* amongst fish in Lake Zaysan and the upper reaches of Irtysh.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (3), 346–347. [In Russian.]

Quoting the work of Podelsnov [for abstract see Helm. Abs., **29**, No. 694], Sidorov points out that *Opisthorchis felineus* metacercariae are present in fish in Lake Zaysan and in the upper reaches of Irtysh, particularly in ide, which explains the infections of man and of animals in these areas. However, the construction of a dam in 1952 has reduced the possibility of infection to a very low figure. N. Jones

865—WILSON, W. D., 1957. [Michigan State University, East Lansing, Michigan, U.S.A.] "Parasites of fishes from Leavenworth County State Lake, Kansas." **Transactions of the Kansas Academy of Science, 60** (4), 393–399.

Of 62 fish (11 species) from a comparatively new fish population in Leavenworth County State Lake, north of Lawrence, 66% were infected with parasites. The species found were *Caryophyllaeus* sp. (according to a personal communication from Bangham this is probably a new

species, the description of which is in the press), *Corallobothrium* sp., *C. giganteum*, larval *Proteocephalus ambloplitis*, *Posthodiplostomum minimum* and *Contracaecum spiculigerum*, *Camallanus oxycephalus* and *Neoechinorhynchus cylindratus*. Three unidentified cysts, probably cestodes, were present in *Ictalurus natalis*, while *I. punctatus* is a new host record for *P. minimum*. Except with *P. minimum* and *Proteocephalus embloplitis*, the infections were generally light. G. I. Pozniak

Marine Fisheries

866—ALDRICH, Jr., L. E., 1960. [Oregon State College, U.S.A.] "Digenetic trematodes from marine fishes in the San Juan Archipelago." **Dissertation Abstracts, 21** (3), 703.

NEMATOLOGY

Free-Living Nematoda

867—ANDRÁSSY, I., 1960. [Institut für Tiersystematik der Universität, Budapest, Hungary.] "Zwei bemerkenswerte Nematoden-Arten aus Belgisch-Kongo." **Opuscula Zoologica. Instituti Zoosystematici Universitatis Budapestinensis, 3** (3/4), 101–110.

Two species of nematodes from forest soil are described and figured. The male of *Eudorylaimus paracentrocercus* (de Coninck, 1935) Andrássy, 1959 is reported for the first time. The spicules are visibly longer than the pointed tail and there are ten small pre-anal supplements. The description of *Xiphinema obtusum* Thorne, 1939 is extended on the basis of two adult females. The sclerotized piece in the oesophagus of many *Xiphinema* species is termed a "mucro" and is surmised to have a role in the formation of a replacement spear. R. W. Timm

868—CHANG, S. L., AUSTIN, J. H., POSTON, H. W. & WOODWARD, R. L., 1959. [Robert A. Taft Sanitary Engineering Center, USPHS, Cincinnati, Ohio, U.S.A.] "Occurrence of a nematode worm in a city water supply." **Journal of the American Water Works Association, 51** (5), 671–676.

Diplogaster nudicapitatus was found, often in some numbers, in the water supply of an American city. A brief description of the adults and of their culture on agar plate with bacteria is given. The larvae withstood 3–5 p.p.m. free residual chlorine at 24°C. to 25°C. and *p*H 7–7·2 for up to three hours. This resistance explains why the nematode can get past the purifying processes. *Monhystera* sp. and *Seinura* sp. were also found in chlorinated raw water. J. B. Goodey

869—GADEA, E., 1957. [Laboratorio de Zoologia, Universidad de Barcelona.] "Comunidades nematodológicas representativas de las altas montañas españolas." **Publicaciones del Instituto de Biología Aplicada. Barcelona, 26,** 127–132. [Discussion p. 133.]

This paper was given at a symposium on Iberian Biogeography at Barcelona in September, 1957. Gadea gives lists of nematodes found in the high Spanish mountains in two main biotopes: (i) terrestrial which is divided into moss growing on neutral, acid or alkaline soil, sphagnum peat, forest soil, pasture and soil under snow; (ii) fresh-water in permanent areas, temporary pools, streams and marshes. J. B. Goodey

870—GERLACH, S. A., 1957. [Zoologisches Institut der Universität Kiel, West Germany.] "Zwei Meeres-Nematoden aus dem Nicaragua-See." **Zoologischer Anzeiger, 159** (9/10), 251–254.

Gerlach gives descriptions and figures of two marine nematodes occurring in the fresh-water Lake Nicaragua. They are *Polygastrophora octobulba* and *Viscosia papillata* subsp. *nicaraguensis* n.subsp. The latter differs from *V. papillata* in the shorter tail and the papilla-like head bristles. J. B. Goodey

871—MEYL, A. H., 1957. "Über einige Süsswasser-Nematoden aus Peru insbesondere aus dem Nicaragua-See." **Archiv für Hydrobiologie, 53** (4), 520–526.
Meyl examined and identified nematodes collected in fresh water in South Peru. He lists those found in the different samples, eight species in seven genera. *Plectus cirratus*, *Trilobus longus* and *Dorylaimus stagnalis* occurred in the water of the Rio Majes, and *Theristus setosus*, *Trilobus longus*, *Viscosia papillata* subsp. *nicaraguensis*, *Polygastrophora octobulba*, *Dorylaimus pseudostagnalis* and *Actinolaimus radiatus* in the Nicaragua lake which he regards as relicts of marine forms. J. B. Goodey

872—PIECZYŃSKA, E., 1959. "Charakter występowania wolnożyjących nicieni (Nematoda) w różnych typach perifitonu jeziora Tajty." **Ekologia Polska. Seria A, 7** (12), 317–337. [English summary pp. 336–337.]
The nematode fauna of the periphyton on plants and other objects in the waters of Lake Tajty was examined. Where the periphyton was thread-like the dominant nematodes were *Punctodora ratzeburgensis*, *Prochromadorella bioculata* and *P. viridis* but in that which was "fleece-like", *Dorylaimus filiformis*, *Plectus granulosus* and *Aphelenchoides parietinus* predominated. In general there were considerable numbers of few species (20), and these numbers were correlated with density of the periphyton. The paper is illustrated by a number of graphs. J. B. Goodey

Plant-Parasitic Nematoda

873—ANON., 1960. "Eelworm in potatoes." **Advisory Leaflet. Department of Agriculture and Fisheries for Scotland.** New series, No. 22, 7 pp. [Revised.]

874—ANON., 1960. "Beet eelworm." **Advisory Leaflet. Ministry of Agriculture, Fisheries and Food. London,** No. 235, 6 pp. [Revised.]

875—ANON., 1960. "Border interceptions." **Canadian Insect Pest Review, 38** (3), 168.
Lonicera plants from Tennessee infected with *Meloidogyne arenaria*, and chrysanthemum and strawberry plants from Indiana with *M. hapla* were intercepted and destroyed. D. J. Hooper

876—AYOUB, S. M., 1960. [California Department of Agriculture, Bureau of Plant Pathology, Sacramento, California, U.S.A.] "A new host of *Pratylenchus coffeae* for the United States.", **Plant Disease Reporter, 44** (9), 755.
Ayoub reports the finding of *Pratylenchus coffeae* in dahlia tubers on two occasions. In the first instance, the infected tuber had no external symptoms. Several tubers in the second instance had surface cracks and blemishes, and one tuber had an estimated population of 50,000 *P. coffeae*. This nematode was also found in soil where dahlias were growing. A list of previously reported hosts of *P. coffeae* is also given. D. J. Hooper

877—BAKER, A. D., 1960. "Some records of nematodes encountered in Canada on native and imported plant material in 1959." **Canadian Insect Pest Review, 38** (1), 107–111.

878—CADMAN, C. H., DIAS, H. F. & HARRISON, B. D., 1960. [Scottish Horticultural Research Institute, Invergowrie, by Dundee, Scotland.] "Sap-transmissible viruses associated with diseases of grape vines in Europe and North America." **Nature. London, 187** (4737), 577–579.
In Portugal, "urticado", a sap-transmissible virus of grape-vines, occurs patchily in vineyards, its distribution coinciding with that of a nematode probably identical with *Xiphinema index*, the vector of "fanleaf" virus of grape-vines in California. *X. americanum* is wide-spread in Portuguese vineyards but apparently not associated with the virus disease. The results of serological tests suggest that the above two viruses and Arabis mosaic virus, transmitted by *X. diversicaudatum*, are all strains of the same virus. R. D. Winslow

879—CARRARO, G., 1958. "Sulla presenza in Tripolitania del nematode degli agrumi (*Tylenchulus semipenetrans* Cobb)." **Redia. Florence, 43,** 103–105. [English summary p. 105.]
Abnormalities in the roots of orange, mandarin and lemon in Tripolitania were found to be due to attack by *Tylenchulus semi-penetrans*. The nematodes were smaller than those described by Cobb. The attack was most severe in sandy soil. M. T. Franklin

880—CARRARO, G. & MARINARI, A., 1958. "Contributo alla conoscenza dei nematodi galligeni della Tripolitania. I. *Meloidogyne javanica* (Treub 1885) Chitwood 1949 su patata e melanzana. *Meloidogyne hapla* Chitwood 1949 su arachide." **Redia. Florence, 43,** 207–214. [English summary p. 213.]
Meloidogyne javanica has been found in Tripolitania attacking potato variety Up-to-Date and eggplant variety Florida Market, but not peanut variety Virginia Bunch. *M. hapla* was found on Virginia Bunch. The two nematode species are described in detail with measurements of males, females, eggs and larvae. M. T. Franklin

881—CHAPMAN, R. A., 1959. "The effects of *Meloidogyne incognita* and *M. hapla* on the growth of Kenland red clover and Atlantic alfalfa." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] **Phytopathology, 49** (9), 535–536.
Meloidogyne incognita reduced the growth of red clover by 77% in 105 days and 83% in 154 days in soil infested with 3,000 and 1,000 larvae per half-gallon, respectively. With similar inocula, *M. incognita* reduced the growth of lucerne by 2% in 175 days and 7% in 381 days. The nematode reproduced well on both plants. *M. hapla* reduced the growth of red clover by 55% in 152 days and by 40% in 317 days in soil infested with 3,000 and 1,000 larvae per half-gallon, respectively. With similar inocula, *M. hapla* reduced the growth of lucerne by 58% in 175 days and by 42% in 381 days. *M. hapla* reproduced well on both plants.
J. J. Hesling

882—COLBRAN, R. C., 1960. "Beet nematode detected in Queensland." **Queensland Agricultural Journal, 86** (8), 495–496.

883—DIETER, A., 1960. [Biologische Zentralanstalt der Deutschen Akademie der Landwirtschaftswissenschaften zu Berlin Institut für Phytopathologie, Aschersleben.] "Beobachtungen über *Heterodera major* O. Schm. an Hafer." **Nachrichtenblatt für den Deutschen Pflanzenschutzdienst. Berlin, 14** (3), 43–48. [English, German & Russian summaries p. 48.]
In pot tests, oats grown in fluctuating temperatures were most heavily infested with *Heterodera major* (synonym *H. avenae*) when the temperature fluctuations were greatest; these plants grew more slowly and were more susceptible to eelworm attack. The results were confirmed in field tests. It was concluded that the stage of development of the host plant and soil conditions favouring hatch have more influence on the intensity of eelworm attack than have the weather conditions of April or May. J. J. Hesling

884—DIKER, T., 1959. [Nematoloji Mütehassısı, Şeker Fabrikası, Ziraî Araştırma Lâboratuvarları, Eskişehir, Turkey.] "Nebat parazit nematodlari." **Türkiye Seker Fabrikaları A. S. Nesriyatı. Ankara,** No. 70, 102 pp. [English summary pp. 99–100.]
This booklet serves two purposes, being both a Turkish handbook of plant nematology and a report on the progress of plant nematode investigations in Turkey, with the emphasis on nematodes of sugar-beet. The most important plant nematodes are species of root-knot: *Meloidogyne arenaria, M. hapla, M. incognita* and *M. javanica*. Their distribution and control—by chemical and cultural methods—is discussed. Crop rotation to introduce nematode-resistant crops is recommended as the most economical method. Other nematodes under investigation include *Heterodera schachtii* on sugar-beet, *Aphelenchoides fragariae* on strawberry, *Anguina tritici* on wheat, and *Ditylenchus dipsaci* on onion. R. D. Winslow

885—DUDDINGTON, C. L. & DUTHOIT, C. M. G., 1960. [The Polytechnic, Regent Street, London, England.] "Green manuring and cereal root eelworm." **Plant Pathology. London, 9** (1), 7–9.
The effect of green manuring in reducing invasion by *Heterodera major* was investigated in plots, each 2 ft. square, separated by grass borders 3 ft. wide. 12 plots were inoculated with

soil known to be infested. Chopped cabbage leaves were added as green manure (at 1·5 lb. per plot) to six plots, the remaining six plots being left untreated. Spring oats were sown, and some plants were carefully lifted seven-and-a-half weeks after sowing. Roots of a representative sample were washed, stained with acid fuchsin in lactophenol, pressed between glass plates, and invading larval stages of *H. major* were counted. Results showed a substantial reduction of infestation in green manure plots. The presence of nematode-trapping fungi was assessed by the Duddington technique and their activity was found to be greater in the treated plots. There was a striking difference in the height and appearance of plants at harvest in treated compared with untreated plots. Ear formation was good in treated plots whilst controls produced little. H. Jacks

886—EUROPEAN & MEDITERRANEAN PLANT PROTECTION ORGANIZATION, 1957. [142, Avenue des Champs-Élysées, Paris, France.] "Potato root eelworm in Europe and the Mediterranean Basin in 1956." **Paris: European and Mediterranean Plant Protection Organization,** 16 pp. [Also in French.]

This report discusses the incidence of potato-root eelworm in Europe and the Mediterranean Basin, as recorded in 1956, together with the methods and criteria used to assess infestation levels. With regard to control and prevention, the only change reported is the development in Scotland of a seed potato washing process, which has a high standard of efficiency. Details are given of the incidence of potato-root eelworm in 25 countries with comments on methods of control and prevention at present in use by them. A. M. Shepherd

887—FENNE, S. B., 1959. [Virginia Polytechnic Institute, Blacksburg, Virginia, U.S.A.] "Summary of plant diseases in Virginia, 1959." **Plant Disease Reporter, 43** (12), 1264–1265.

This is a general account, nematodes being mentioned but not named. J. J. Hesling

888—FOSTER, H. H., 1960. "Identification and preplant control of parasitic nematodes attacking peach trees in South Carolina." [Abstract of paper presented at the 1960 Annual Meeting of the Southern Division, American Phytopathological Society.] **Phytopathology, 50** (8), 575.

889—GEMMA, T. & SHIBUYA, T., 1959. [Yamagata Agricultural College, Tsuruoka, Yamagata-Ken, Japan.] [On the nematode parasites of the root cortex of lowland rice in Tagawa Province, Yamagata-Ken.] **Yamagata-Norin-Gakkaihô,** No. 14, pp. 11–14. [In Japanese: English summary pp. 12–13.]

Gemma & Shibuya observed several unidentified species of nematodes in the root cortex of lowland rice. All nematode species were situated in the lacuna in the cortex of crown roots without the formation of galls or causing root-rot. In winter they were found in the root cortex even when it was dead. It seems that most nematodes are killed under field conditions when the paddy soil is dried or frozen. They also found nematodes in the roots of certain paddy weeds which were not found in the upland rice root. An accumulation of certain substances which stained with Delafield's haematoxylin was detected in the area surrounding the top of the nematode where the lacuna was not yet formed. The nematodes were rarely found in paddy fields bounded by hill forests or in well drained fields. M. Ichinohe

890—GIAMALVA, M. J., MARTIN, W. J. & HERNANDEZ, T. P., 1960. "Reaction of 8 sweet potato selections to 5 species of root-knot nematodes." [Abstract of paper presented at the 1960 Annual Meeting of the Southern Division, American Phytopathological Society.] **Phytopathology, 50** (8), 575.

891—GOFFART, H., 1959. [Biologische Bundesanstalt, Institut für Hackfruchtbau, Münster (Westf.), Toppheideweg 88, Germany.] "Über *Heterodera trifolii* Goffart 1932 (Nematoda: Heteroderidae) an Nelken." **Gartenbauwissenschaft, 24** (6), 104–107.

Heterodera trifolii was studied on *Dianthus heddewigii*. No visible symptoms were produced on the plants. There are details of the host range and identification of the nematode.

J. J. Hesling

892—GOLDEN, A. M. & SHAFER, T., 1959. [Crops Research Division, USDA, Beltsville, Maryland, U.S.A.] "Host-parasite relationships of various plants and the sugar-beet nematode (*Heterodera schachtii*)." **Plant Disease Reporter, 43** (12), 1258–1262.

Golden & Shafer tested 48 plant collections, representing 37 species of crop plants and weeds, for susceptibility to *Heterodera schachtii*, in comparison with the susceptibility of sugar-beet. Some species not previously tested were found to be susceptible at least to some degree. Other species gave results in agreement with those of Jones, 1950 [for abstract see Helm. Abs., **19,** No. 278a], Winslow, 1954 [for abstract see Helm. Abs., **23,** No. 357a], and Raski, 1952 [for abstract see Helm. Abs., **21,** No. 31a], with two exceptions. 12 collections were also examined in comparison with sugar-beet for the activity of their root diffusates on cysts of beet eelworm. Only one was approximately as effective as sugar-beet but most of the others gave a hatch greater than that in water. The penetration of larvae of *H. schachtii* and their development was tested in eight of these plants by growing them in soil heavily infested with cysts. Mature males were found on two non-host plants. It is suggested that since the non-host bean (*Phaseolus vulgaris*) had a stimulatory effect on the emergence of larvae from cysts and was also invaded by larvae, that it may be of use in rotations for reducing this nematode. A. M. Shepherd

893—GOODEY, J. B., 1960. [Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, U.K.] "Observations on the effects of the parasitic nematodes *Ditylenchus myceliophagus*, *Aphelenchoides composticola* and *Paraphelenchus myceliophthorus* on the growth and cropping of mushrooms." **Annals of Applied Biology, 48** (3), 655–664.

The parasitic nematodes *Ditylenchus myceliophagus*, *Aphelenchoides composticola* and *Paraphelenchus myceliophthorus* severely damage mushroom mycelium and in great numbers reduce or even prevent cropping. The relationships between fluctuation of nematode population, state of the mycelium, duration of cropping and the yield of mushrooms are illustrated in a series of figures. J. B. Goodey

894—GRAHAM, T. W., 1960. "A root-knot-resistant tobacco breeding line released to breeders." [Abstract of paper presented at the 1960 Annual Meeting of the Southern Division, American Phytopathological Society.] **Phytopathology, 50** (8), 575–576.

895—HESLING, J. J., 1958. [Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, U.K.] "The efficiency of certain grasses as hosts of cereal root eelworm." **Plant Pathology, 7** (4), 141–143.

Perennial rye-grass (*Lolium perenne*), Italian rye-grass (*L. italicum*), cocksfoot (*Dactylis glomerata*) and Timothy (*Phleum pratense*) were tested in pots as hosts of *Heterodera avenae* (synonym *H. major*). Timothy was a very poor host and the other grasses supported only low populations; it is suggested that a substantial eelworm reduction will occur if infested fields are put down to grass, followed by one or two years of non-host crops. J. J. Hesling

896—HESLING, J. J., 1959. [Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, U.K.] "Some observations on the cereal-root eelworm population of field plots of cereals with different sowing times and fertilizer treatments." **Annals of Applied Biology, 47** (3), 402–409.

The population change of *Heterodera avenae* (synonym *H. major*) was studied on field plots autumn or spring sown with either oats, barley, wheat or rye. Some plots had fertilizer. Each plot received the same treatment for three years; in the fourth year spring oats were grown on all plots. After rye and autumn-sown wheat, the eelworm population fell to a level which permitted a good oat crop in 1957. Autumn-sown wheat, barley and rye generally produced lower eelworm populations than when spring sown, autumn-sown oats was the most efficient host. Fertilizer treatment generally increased the eelworm population. All the oat plots and spring-sown barley plus fertilizer produced populations which severely damaged the 1957 oat crop, the level of population at which damage appeared being between 15 and 20 larvae per gramme of soil. J. J. Hesling

897—HUTCHINSON, M. T., REED, J. P. & PRAMER, D., 1960. [New Jersey Agricultural Experiment Station, New Brunswick, New Jersey, U.S.A.] "Observations on the effects of decaying vegetable matter on nematode populations." **Plant Disease Reporter, 44** (6), 400–401.

In a field of barley found by Hutchinson *et al.* to be severely injured by *Hoplolaimus tylenchiformis* and *Pratylenchus pratensis*, areas of good growth appeared where piles of pumpkins had been left to rot 18 months previously. Numbers of plant-parasitic and microphagous nematodes in these areas were lower than in the surrounding bad areas. There was no apparent correlation between this difference and the present distribution of predacious nematodes and nematode-trapping fungi. R. D. Winslow

898—ICHINOHE, M., 1959. [National Institute of Agricultural Sciences, Tokyo, Japan.] "Studies on the soybean cyst nematode *Heterodera glycines* and its injury to soybean plants in Japan." **Plant Disease Reporter. Supplement 260,** pp. 239–248.

This is a comprehensive account of the soya bean cyst nematode which includes an historical review and details of the distribution of the eelworm in Asia. The eelworm morphology is described and host plants are listed. Damage to the plant, the nature of varietal resistance and control measures are discussed. J. J. Hesling

899—JONES, F. G. W., 1960. [Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, U.K.] "Plant parasitic nematodes." **Advancement of Science. London, 17** (66), 174–180.

After a brief introduction Jones deals with plant-parasitic nematodes under five sections. (i) In "Systematics" he mentions the difficulties involved in handling nematodes and the care needed in their preparation and observation. He makes some provocative remarks about the qualities necessary in the systematist and makes a plea that directors of research should see the need for supplying the most advanced microscopes available. (ii) "Soil phase" deals with the factors of soil particle size, pore size and water tension and their bearing on nematode movement. (iii) Under "Plant phase" he points out that the different backgrounds of nematologists, either zoological or botanical, lead to appreciation of different parts of nematode bionomics and pleads for more co-operation between a wider range of scientific disciplines. (iv) "Host range and host-parasite relationships" mentions so-called biologic races and biotypes and the difficulties their presence causes in attempting to breed resistant varieties of plants. (v) "Control" mentions the lack of satisfactory soil nematicides compared with insecticides and fungicides. The need for more fundamental work in this field is stressed. Jones concludes by pointing out the challenge inherent in the ideal of being able to culture plant-parasitic nematodes on artificial media. J. B. Goodey

900—KUIPER, K., 1959. [Plantenziektenkundige Dienst, Wageningen, Netherlands.] "Inoculatieproeven met *Hemicycliophora typica*." **Mededelingen van de Landbouwhogeschool en de Opzoekingsstations van de Staat te Gent, 24** (3/4), 619–627. [English summary p. 626.]

Symptoms of poor growth in carrots and some other crops growing on marine sandy soil disappeared after treatment of the soil with nematicides. The infected crops had shown symptoms of "stubby root" and the nematode *Hemicycliophora typica* was found associated with these symptoms. Typical root symptoms were produced on carrots grown in sterilized soil inoculated with this nematode, but only slight or no symptoms have been obtained on beet, wheat and iris up to the present. However, the nematodes propagated on all these crops. Reproduction without males seems to take place. A. M. Shepherd

901—LAU, N. E. & REED, J. P., 1960. [Department of Entomology, New Jersey Agricultural Experiment Station, New Brunswick, New Jersey, U.S.A.] "Nematodes associated with red clover in its second growth year." **Plant Disease Reporter, 44** (6), 402–404.

Lau & Reed examined soil and root samples from 23 second-year red clover fields. 17 "stylet bearing" nematode genera were encountered in soil samples and 11 in root samples. Known parasitic genera encountered were *Hoplolaimus*, *Ditylenchus*, *Criconemoides*, *Meloidogyne*, *Paratylenchus*, *Pratylenchus* and *Tylenchorhynchus*. *Aphelenchus* occurred in 74% of the root samples and *Hoplolaimus* and *Pratylenchus* in 57%. In the soil samples 74% contained *Paratylenchus* and 69% *Aphelenchus*. The average number of stylet nematodes found was 186 per gramme of root and 13,897 per pint of soil. D. J. Hooper

902—LOOS, C. A. & LOOS, S. B., 1960. [Banana Board of Jamaica, Kingston Gardens, Kingston, Jamaica, W.I.] "The black-head disease of bananas (*Musa acuminata*)." **Proceedings of the Helminthological Society of Washington, 27** (2), 189–193.

Black-head disease—the partial to complete blackening of the banana rhizome—is caused by the burrowing nematode *Radopholus similis*. Nematode infection is usually via rootlets into the cortical tissues of fleshy primary roots giving rise to black-brown lesions. In longitudinal section these lesions are confined to the cortex and the edges of the lesions have a characteristic pink-red coloration where all stages of *R. similis* are present; the older blackened part of the lesion contains bacteria and fungi. Rhizomes are infected via the roots, the lesions forming large patches which may be up to two-and-a-half inches deep. Because of their poor root system well infected plants are easily toppled by wind. Infection is often spread by the use of diseased "seed" rhizomes. Evidence is given for the existence of different physiological races of *R. similis* from different locations. The disease symptoms associated with *R. similis* are illustrated by photographs. D. J. Hooper

903—LOWNSBERY, B. F., 1960. [Department of Plant Nematology, University of California, Davis, California, U.S.A.] "Stimulation of walnut by Schradan (OMPA) is not the result of root-lesion nematode control." **Plant Disease Reporter, 44** (9), 690–691.

904—LUC, M., 1959. [Laboratoire de Nématode, Institut d'Enseignement et de Recherches Tropicales, Abidjan, Ivory Coast, West Africa.] "Nématodes parasites ou soupçonnés de parasitisme envers les plantes de Madagascar." **Bulletin. Institut de Recherches Agronomiques de Madagascar,** No. 3, pp. 89–101.

After a general introduction to plant-parasitic nematodes, the damage they cause and their control by cultural and chemical means, Luc gives preliminary observations on the nematodes he found associated with 36 species of plants during a three months' visit to Madagascar. A number of new hosts are recorded for *Meloidogyne javanica*, *Helicotylenchus nannus*, several species of *Pratylenchus* and a few ectoparasitic nematodes. The commonest species was *M. javanica*. It was wide-spread in vegetable gardens on many plants. At the seed potato selection and multiplication centre it is a serious pest, all varieties being attacked with losses of 10% to 20%. There is a serious risk of the nematode being spread on seed tubers. It occurs also on the crops used in rotation and it is suggested that resistant crops such as certain *Crotalaria* spp. and *Eragrostis curvula* var. Ermelo be substituted for the susceptible ones. *Radopholus oryzae* was found in soil from one of three rice fields and *Pratylenchus brachyurus* in rice roots in two cases. In sugar-cane seven species of nematode were observed; *Scutellonema brachyurum* appeared to be associated with poor growth. Nearly all the tobacco fields examined contained *Meloidogyne javanica* and it also occurred in some tobacco seed-beds. As a result of his investigations the author lists a number of nematological problems which should be studied in Madagascar. M. T. Franklin

905—McKEEN, C. D. & MOUNTAIN, W. B., 1960. [Research Station, Research Branch, Canada Department of Agriculture, Harrow, Ontario, Canada.] "Synergism between *Pratylenchus penetrans* (Cobb) and *Verticillium albo-atrum* R. & B. in eggplant wilt." **Canadian Journal of Botany, 38** (5), 789–794.

In the absence of *Verticillium albo-atrum*, *Pratylenchus penetrans* had no significant effect on egg-plant (*Solanum melongena* L.) seedlings grown in five-inch pots, even at dosages as high as 4,000 nematodes per pot. The fungus alone was pathogenic, but the additional of the nematodes greatly enhanced the effectiveness of certain dosages of the fungus, and the presence of these dosages of the fungus led to increased final numbers of nematodes. The possible significance of such interactions on the population dynamics of plant-parasitic nematodes is noted, and some possible mechanisms of the synergism are discussed. R. D. Winslow

***906**—MAI, W. F., 1957. "Medidas para combatir los nematodes parasitos de las plantas." **Agrotecnia, 12,** 23–33.

907—MANKAU, R., 1959. [Citrus Experiment Station, University of California, Riverside, California, U.S.A.] "*Polygonum persicaria* L., a new host for *Heterodera trifolii* Goffart." **Plant Disease Reporter, 43** (12), 1230.

908—MARTIN, G. C., 1959. [Entomology Branch, Federal Ministry of Agriculture, P.O. Box 8025, Causeway, Salisbury, Southern Rhodesia.] "Plants attacked by root-knot nematodes in the Federation of Rhodesia and Nyasaland." **Rhodesia Agricultural Journal, 56** (4), 162–175.
This article is based on two earlier papers [for abstracts see Helm. Abs., **27,** No. 262j and **28,** No. 43t] but contains some additional records and a separate list of the common names of the plants recorded. *Meloidogyne javanica* appears to be indigenous in the Federation of Rhodesia and Nyasaland and *M. incognita* var. *acrita*, *M. hapla* and *M. arenaria* appear to have been introduced. M. T. Franklin

909—MARTIN, G. C., 1960. "The root-knot nematode in Central Africa." **Span. London, 3** (3), 129–132.
In the Federation of Rhodesia and Nyasaland *Meloidogyne javanica* (Treub, 1885) is found on virgin land. Infestations on land having a history of cultivation often involve *M. hapla*, *M. arenaria* and *M. incognita* var. *acrita* (Chitwood, 1949). Many crops may suffer but in particular the damage to tobacco is considerable. Seed-bed hygiene has been improved by resiting the beds away from sources of infestation. Chemical control started with D-D in 1946, but this has later been replaced to some extent by ethylene dibromide and methyl bromide. The last-named chemical is becoming increasingly popular as it also controls weeds and anthracnose. J. E. Peachey

910—MINTON, E. B., SMITH, A. L. & CAIRNS, E. J., 1960. "Population build-up and pathogenicity of reniform, root-knot, lance, and spiral nematodes on cotton, soybean, and tomato in field bins." [Abstract of paper presented at the 1960 Annual Meeting of the Southern Division, American Phytopathological Society.] **Phytopathology, 50** (8), 576.

911—MULVEY, R. H., 1960. [Nematology Section, Entomology Research Institute, Department of Agriculture, Ottawa, Canada.] "Giant larvae of the clover cyst-nematode *Heterodera trifolii* (Nematoda: Heteroderidae)." **Nematologica, 5** (1), 53–55. [German summary p. 55.]
Females of the second generation of *Heterodera trifolii*, after its culture with *H. schachtii*, produced a few giant larvae among several thousand normal larvae. The giant larvae measured 675 μ by 32 μ, and were apparently tetraploid. J. J. Hesling

912—NICKLE, W. R., 1960. [Department of Plant Nematology, University of California, Davis, California.] "Nematodes associated with the rootlets of western white pine in northern Idaho." **Plant Disease Reporter, 44** (7), 470–471.
In *Pinus monticola* plantations where the disease "white pole" occurred, Nickle found *Criconemoides sphaerocephalum* and species of *Tylenchorhynchus*, *Criconema* and *Heterodera* confined to the diseased areas, with *Trichodorus elegans* and *Helicotylenchus* sp. occurring in both diseased and healthy areas. White females of the *Heterodera* were found on the pine rootlets, with larvae and males in the surrounding soil. R. D. Winslow

913—OOSTENBRINK, M., 1959. [Plantenziektenkundige Dienst, Wageningen, Netherlands.] "Wachstumssteigerung durch Bodenbehandlung mit Nematiziden." **Mitteilungen aus der Biologischen Bundesanstalt für Land- und Forstwirtschaft,** No. 97, pp. 117–120.
In a general article Oostenbrink discusses the following factors and their interaction—nematicidal action, crop response, cropping sequence and changes in species composition of plant-parasitic nematodes. J. E. Peachey

914—PRASAD, N., MATHUR, R. L. & SEHGAL, S. P., 1959. [Plant Pathology Section, Rajasthan Department of Agriculture, Udaipur, India.] "Molya disease of wheat and barley in Rajasthan." [Correspondence.] **Current Science. Bangalore, 28** (11), 453.
The symptoms of "molya", a serious disease of wheat and barley in certain districts of Rajasthan, are described. The authors state that *Heterodera avenae* Wollenweber was associated with the roots of all diseased plants examined and that pathogenicity of the nematode on wheat was established by pot experiments. This is thought to be the first record of *H. avenae* in India. R. D. Winslow

915—PRICE, D., 1960. "The control of parasitic eelworms in bananas." **Tropical Agriculture. Trinidad, 37** (2), 107–109.

Radopholus similis damage can result in blackhead and toppling over of banana plants in stormy weather. The application of Nemagon, by injection or watering, to the root areas of established Lacatan bananas resulted in increased growth, leaf production and leaf retention. Treatment is considered profitable for the Southern Cameroons. J. E. Peachey

916—PUCCI, E., 1960. "Rassegna dei principali casi fitopatologici osservati in Tripolitania." **Rivista di Agricoltura Subtropicale e Tropicale, 54** (1/3), 34–53.

Meloidogyne sp. and *Heterodera göttingiana* are mentioned in this report of principal pathological cases observed in Tripolitania in 1959. J. J. Hesling

917—RANGASWAMI, G., VASANTHARAJAN, V. N. & VENKATESAN, R., 1960. [Department of Agriculture, Annamalai University, Annamalainagar, Madras, India.] "The occurrence of root-knot nematodes on sugarcane and on some weeds." [Correspondence.] **Current Science. Bangalore, 29** (6), 236–237.

A disease of sugar-cane in Madras State is described in which the plants are stunted and leaves chlorotic. The roots were found to be galled and from them were obtained a species of *Tylenchorhynchus* and *Meloidogyne javanica*. The common weeds *Acalyphia indica*, *Gynandropsis pentaphylla* and *Cleome viscosa* were also infected. In pot experiments the pathogenicity of *M. javanica* from sugar-cane and from *A. indica* was established on both these plants.
M. T. Franklin

918—ROSS, J. P., 1959. "Interaction of *Meloidogyne incognita incognita* and *Heterodera glycines* on soybeans." [Abstract of paper presented at the 51st Annual Meeting of the American Phytopathological Society, University Park, Pa., August 31 to September 2, 1959.] **Phytopathology, 49** (9), 549.

Ross studied the interaction of *Meloidogyne incognita incognita* and *Heterodera glycines* in methyl bromide sterilized soil in microplots; the soil was artificially infested. The *Meloidogyne* population was suppressed in the last two-thirds of the growing season in the presence of *H. glycines*. Soya bean cyst nematode disease was intensified by the presence of the root-knot nematode. Results were assayed by counts of *Heterodera* and *Meloidogyne* larvae in soil, and by yields of soya bean per plant. J. J. Hesling

919—ROSS, J. P., 1959. [North Carolina Agricultural Experiment Station, Raleigh, North Carolina, U.S.A.] "Nitrogen fertilization on the response of soybeans infected with *Heterodera glycines*." **Plant Disease Reporter, 43** (12), 1284–1286.

Nitrogen applied as nitrate of ammonia at 20, 120 and 210 lb. per acre to soya beans on *Heterodera glycines* infested land increased both the soya bean yield and the final nematode populations. J. J. Hesling

920—SASSER, J. N., 1957. [Division of Biological Science, Plant Pathology, Box 5397, North Carolina State College, Raleigh, North Carolina, U.S.A.] "*Heterodera glycines*, the present situation." **Proceedings of the S-19 Workshop in Phytonematology, University of Tennessee,** July 1–6, 1957, 8 pp.

This is a general account of research on *Heterodera glycines* in the U.S.A. The history of its discovery is followed by brief accounts of the research into its identification, life-history, biology and control. Resistance of soya bean varieties, and the distribution of the nematode are mentioned. J. J. Hesling

921—SEINHORST, J. W. & RIEZEBOS, D., 1959. [Instituut voor Plantenziektenkundig Onderzoek, Wageningen, Netherlands.] "Proeven over de bestrijding van staartpeen." **Mededelingen. Directeur van de Tuinbouw. 's-Gravenhage, 22** (10), 620–625. [English summary p. 625.]

A carrot disease called "staartpeen" (tailed carrot) was greatly reduced by spring treatment of soil with 50 ml. of D-D per square metre, but the second crop grown showed no improvement. Soil treatment with D-D in late summer resulted in residual phytotoxicity. Treatment with D-D improved the second crop of carrots where *Hoplolaimus uniformis* was also present although Vapam had no effect on the eelworm or on the incidence of "tailed carrots". The importance of *H. uniformis* remains unknown as also the cause of "staartpeen". J. B. Goodey

922—SHIMOKAWA, M. & USIYAMA, K., 1960. [Kanagawa Prefecture Agricultural Experiment Station, Hiratsuka, Kanagawaken, Japan.] [On black root rot in strawberry caused by *Pratylenchus* sp.] **Kanagawa-ken Nôgyôshikenjô Engeunjô Kenkyuhôkoku,** No. 8, pp. 54–59. [In Japanese: English summary p. 59.]

The disease in strawberry plantations which has been prevailing in Kanagawa Prefecture recently was found to be due to black root rot caused by *Pratylenchus* sp. and probably to secondary infection with fungi. The use of methyl bromide (2 c.c. per 30 sq. cm.) and Vapam (5 c.c. to 8 c.c. per sq. cm.) followed by Nemafume 30, Nemagon and chloropicrin is effective in controlling the nematode. M. Ichinohe

923—SIEFF, D., 1959. [Experiment in the control of tomato eelworms.] **Hassadeh, 39,** 1011–1016. [In Hebrew.]

Soil treatment with Edictol and Nemagon helped tomato seedling development in the nursery. Fumigation with ethylene dibromide in the field killed root-knot nematodes in the soil and increased the subsequent yields of tomatoes. Root-knot nematodes were found in many common weeds, thus it is essential to remove weeds so that the pest cannot persist in the soil from season to season. [Based on an English translation.] H. R. Wallace

924—SOL, H. H., HEUVEN, J. C. VAN & SEINHORST, J. W., 1960. [Instituut voor Plantenziektenkundig Onderzoek, Wageningen, Netherlands.] "Transmission of rattle virus and *Atropa belladonna* mosaic virus by nematodes." **Tijdschrift over Plantenziekten, 66** (3), 228–231. [Dutch summary pp. 230–231.]

When nematode suspensions from soil containing either rattle virus or *Atropa belladonna* mosaic virus were added to healthy or sterilized soil in which tobacco plants were grown, the plants became infected. When nematodes from healthy soil were added, none of the test plants became infected. The authors conclude that some of the nematodes present in the diseased soil (which did not contain *Xiphinema*) were transmitting the viruses, although further tests on two suspect nematodes, *Hoplolaimus uniformis* and *Hemicycliophora* sp., gave negative results. R. D. Winslow

925—STELTER, H., 1960. [Institut für Pflanzensüchtung, Gross-Lüsewitz.] "Neue Fundorte von *Heterodera galeopsidis* Goffart in Deutschland." **Naturwissenschaften. Berlin, 47** (7), 166.

Stelter reports the rediscovery of *Heterodera galeopsidis* in Germany. Cysts, presumed to be of this species, were found on *Lamium album* L. J. J. Hesling

926—STURHAN, D., 1960. "Der Möhrennematode, *Heterodera carotae*, in Deutschland." **Zeitschrift für Pflanzenkrankheiten (Pflanzenpathologie) und Pflanzenschutz, 67** (9), 543–544.

In a field near Nürnberg *Heterodera carotae* has been found on carrots for the first time in Germany. Sturhan describes the nematodes giving detailed measurements which agree with those for the Dutch and English populations. M. T. Franklin

927—TAMURA, I. & KEGASAWA, K., 1957. [Hokuriku National Agricultural Experiment Station, Takada, Niigata Prefecture, Japan.] [Studies on the ecology of the rice nematode, *Aphelenchoides besseyi* Christie. I. On the swimming away of rice nematodes from the seeds soaked in water and the relation to the water temperatures.] **Japanese Journal of Ecology, 7** (3), 111–114. [In Japanese: English summary pp. 111–112.]

Experiments were made to determine the condition causing *Aphelenchoides besseyi* to leave rice seed after it is sown in the seed-bed and to enter the bud of the germinating seedling. It was found that nematodes left infected seeds soaked in water at temperatures of 20°C., 25°C. and 30°C., swimming away soonest at the highest temperature. At 35°C. no nematodes left the seeds. The rapidity of germination increased with rise in temperature and it is suggested that the swimming away of the nematodes is closely connected with germination, but not with the length of the shoots. After soaking for 150 hours at 20°C., 35% of the nematodes remained in the seeds and 53% were dead; at 25°C., 22% remain and 67% were dead; at 30°C., 18% remained and 91% were dead; at 35°C., all were dead. It is concluded that the optimum temperature for nematodes to leave the seeds is 20°C., but many remain behind.

M. T. Franklin

928—TAMURA, I. & KEGASAWA, K., 1959. [Hokuriku National Agricultural Experiment Station, Takada, Niigata Prefecture, Japan.] [Studies on the ecology of the rice nematode, *Aphelenchoides besseyi* Christie. IV. The injurious feature and population dynamics of nematodes in unhulled rice grain with special reference to the cultural environment of rice plant.] **Japanese Journal of Ecology, 9** (2), 65–68. [In Japanese: English summary p. 65.]

Tamura & Kegasawa describe the results of pot experiments on *Aphelenchoides besseyi* conducted from 1955 to 1957. (i) The ability of the nematode to infect rice seedlings appeared to be less in wet soil conditions than in the paddy water condition, although the highest ratio of injured stems was obtained in a pot of wet soil inoculated with nematodes suspended in water two days before seeding. (ii) Although the proportions of injured stems in both soil conditions were higher in the pots kept at high temperatures within a green-house than in the ones placed in shade with reed screens, smaller numbers of nematodes in unhulled rice grain were found in the former than in the latter. (iii) The effect of nitrogen, calcium silicate, and urea fertilizer on the nematode injury of plant was indistinct. Plant injury was more severe in pots in which soil had been dressed with fertilizers such as ammonium sulphate, superphosphate of lime and potassium chloride than in those dressed with calcium silicate alone or sprayed with urea on the leaves. However, no differences in the number of nematodes were observed in unhulled rice grain in either case. M. Ichinohe

929—TAMURA, I. & KEGASAWA, K., 1959. [Hokuriku National Agricultural Experiment Station, Takada, Niigata Prefecture, Japan.] [Studies on the ecology of the rice nematode, *Aphelenchoides besseyi* Christie. V. On the abnormal growth of rice plant and decrease in yield caused by rice nematode.] **Japanese Journal of Ecology, 9** (3), 120–124. [In Japanese: English summary pp. 120–121.]

Rice seed infected with *Aphelenchoides besseyi* showed a somewhat lower proportion of germination than uninfected seed and there was a slight delay of the maximum germination in the infected seed. The height of plants infected from the seedling stage is approximately one half that of uninfected plants. A positive correlation was found between the proportion of injured stems in early August and the proportions of the injured stems on 1st and 24th September. A negative correlation was found between the proportion of the injured stems and the height of the plant, with the highest correlation coefficient in late August, between the proportion of the injured stems and the number of stems, with the highest correlation coefficient in early August, and between the proportion of the injured panicles and the proportion of the injured stems with the highest correlation coefficient of approximately 0·9. The negative correlations between the proportion of the injured stems and such yield characters as the length and weight of the panicles and the weight of rice grains were more distinct in Ginchu, a suceptible variety, than in Norin No. 43, a resistant variety. The regression equation indicated that, provided all stems of a hill are injured by the nematode, the maximum yield reduction will be approximately 60% and 20% in Ginchu and Norin No. 3 respectively. M. Ichinohe

930—TARJAN, A. C., 1960. "Some effects of African marigold on the citrus burrowing nematode, *Radopholus similis*." [Abstract of paper presented at the 1960 Annual Meeting of the Southern Division, American Phytopathological Society.] **Phytopathology, 50** (8), 577.

931—TAYLOR, D. P., 1960. [Department of Plant Pathology and Botany, University of Minnesota, St. Paul, Minnesota, U.S.A.] "Host range study of the spiral nematode, *Helicotylenchus microlobus*." **Plant Disease Reporter, 44** (9), 747–750.

Taylor cultured *Helicotylenchus microlobus* by adding hand-picked batches to Marglobe tomatoes which were then used for host range tests. Of 127 plant varieties tested, representing 48 botanical species and varieties contained in 14 families, 94 varieties were rated as hosts of *H. microlobus*. All varieties of the following major crops tested were rated as hosts: field corn, oats, barley, rye, common and durum wheat, red clover, sugar-beet, potato and soya bean except var. Hawkeye. Non-hosts included lucerne, flax and pea. D. J. Hooper

932—TIMM, R. W., 1959. [Notre Dame College, Dacca, East Pakistan.] "Nematodes associated with wilting of jute." **Pakistan Journal of Biological and Agricultural Sciences, 2** (1), 39–41.
Wilting and death of both species of jute grown in East Pakistan, *Corchorus olitorius* and *C. capsularis*, were found to be associated with heavy infections of *Meloidogyne javanica* and an undescribed species of *Hoplolaimus*. R. W. Timm

933—VISSER, T., 1959. [Tea Research Institute, Talawakelle, Ceylon.] "Practical aspects of the eelworm problem in tea." **Tea Quarterly. Tea Research Institute of Ceylon, 30** (4), 143–149.
This article contains much of the information about *Pratylenchus coffeae*, *Meloidogyne javanica* and *M. brevicaudus* attacking tea previously given by Visser & Vythilingam, 1959 [for abstract see Helm. Abs., **29**, No. 1951]. Features of practical importance in tea growing are further discussed. To "recondition" nematode infested ground the combined cultivation of Guatemala grass and marigolds is advocated. D. J. Hooper

934—WEISCHER, B., 1960. [Biologische Bundesanstalt für Land- und Forstwirtschaft, Institut für Hackfruchtkrankheiten und Nematodenforschung, Münster, West Germany.] "Aktivitätszustand und Strahlenempfindlichkeit beim Kartoffelnematoden (*Heterodera rostochiensis* Woll.)." **Mitteilungen aus der Biologischen Bundesanstalt für Land- und Forstwirtschaft,** No. 99, pp. 59–65. [English summary p. 65.]
Larvae from three-month-old cysts of *Heterodera rostochiensis* were more sensitive to irradiation from a radium source than were larvae from one-year-old cysts. To determine whether this was due to difference in age or in degree of anabiosis, larvae were exposed to a radium source emitting 400 roentgens per hour in a factorial experiment involving three-month-old larvae compared with one-year-old larvae, larvae activated by root diffusate compared with those not activated, and 24 hours' exposure compared with 48 hours' and untreated. Results indicated that the age of the larvae had relatively little effect, and activated larvae were much more sensitive than non-activated. In terms of hatchable larvae, irradiation for 48 hours reduced reproduction from activated nematodes to 1·5% and that from non-activated to 44% of the reproduction from non-irradiated controls. R. D. Winslow

935—WYLLIE, T. D. & TAYLOR, D. P., 1960. [Department of Plant Pathology and Botany, University of Minnesota, St. Paul, Minnesota, U.S.A.] "*Phytophthora* root rot of soybeans as affected by soil temperature and *Meloidogyne hapla*." **Plant Disease Reporter, 44** (7), 543–545.
In experiments at various temperatures, Wyllie & Taylor found that inoculation of Harosoy soya beans with both *Phytophthora sojae* and *Meloidogyne hapla* caused more severe symptoms than either pathogen alone. *P. sojae* alone had a more severe effect on plant growth than did *M. hapla* at the inoculation rates used. Damage by these organisms was most severe at soil temperatures above 20°C. and increased as temperature increased up to 30°C. to 35°C. For *M. hapla* alone, however, the optimum temperature was 25°C. to 30°C., this being the temperature at which most severe galling occurred. A. M. Shepherd

***936**—ZEMLYANSKAYA, A. I., TIKHONOVA, L. V. & KARIMOVA, I. S., 1957. [Parasitic roundworms—nematodes of agricultural crops in Uzbekistan.] **Tashkent: Akademiya Nauk Uzbekskoi SSR,** 207 pp. [In Russian.]

Insect-Parasitic Nematoda

937—RÜHM, W., 1957. "Bestimmungsschlüssel der häufigsten mit Insekten vergesellschafteten Nematodenlarven der Phasmidia Chitwood & Chitwood 1933 nebst einigen Bermerkungen." **Zoologischer Anzeiger, 159** (9/10), 235–251.
The morphology of the larvae of entomophilic nematodes in the Diplogasteridae, Rhabditidae, Cephalobidae, Carabonematidae and Tylenchida, is discussed and characters assessed for their value in identification. Behaviour characteristics, such as nematode movement, host and organ specificity, distribution of various developmental stages, and floating or swimming of larvae in water, are likewise discussed and appraised. Both types of characteristics are used in a key to the larval forms of 21 genera and five subgenera. H. E. Welch

938—SEN, P. & DAS GUPTA, S. K., 1958. "*Mermis* (nematode) as an internal parasite of *Culicoides alatus* (Ceratopogonidae)." **Bulletin of the Calcutta School of Tropical Medicine, 6** (1), 15.
Mermis worms found in the haemocoel of three of 200 specimens of *Culicoides alatus* (Diptera: Ceratopogonidae) near Calcutta apparently did not hinder insect flight. There was no evidence of filariid larvae in the *Culicoides*. H. E. Welch

939—THÉODORIDÈS, J., 1957. [Laboratoire d'Évolution des Êtres organisés et Laboratoire Arago, Banyuls-sur-Mer, France.] "Parasites intestinaux de *Hydrophilus* (*Hydrous*) *pistaceus* Lap. (Col. Hydrophilidae) observés à Banyuls." **Vie et Milieu. Paris, 8** (1), 115–117.
Théodoridès found in the intestine of *Hydrophilus* (*Hydrous*) *pistaceus* collected in 1956, a nematode which he provisionally ascribes to *Toddinema hydrophili*. N. Jones

940—WELCH, H. E., 1960. [Entomology Research Institute for Biological Control, Research Branch, Canada Dept. of Agriculture, Belleville, Ontario, Canada.] "Notes on the identities of mermithid parasites of North American mosquitoes, and a redescription of *Agamomermis culicis* Stiles, 1903." **Proceedings of the Helminthological Society of Washington, 27** (2), 203–206.
Nine records of mermithids in North American mosquitoes reveal three species of which *Hydromermis churchillensis* Welch, 1960, is valid, and two, *Agamomermis culicis* Stiles, 1903, and *A. canadensis* (Steiner, 1924) n.comb. are *species inquirendae*. *A. culicis* is redescribed from a re-examination of Stiles' specimens, and material collected by Stabler [for abstract see Helm. Abs., **21**, No. 20z] near the type locality. H. E. Welch

Control

941—APT, W. J., AUSTENSON, H. M. & COURTNEY, W. D., 1960. "Use of herbicides to break the life cycle of the bentgrass nematode *Anguina agrostis* (Steinbuck 1799) Filipjev 1936." **Plant Disease Reporter, 44** (7), 524–526.
Apt *et al.* treated a field of *Agrostis tenuis*, well infested with *Anguina agrostis*, with six herbicidal chemicals in an attempt to prevent seed heading of the grass, thus controlling the nematode by interrupting its life-cycle. At appropriate rates Dalapon and maleic hydrazide were 98% effective in preventing seed heading. Amitrol permitted considerable seed heading but the larvae in galls from infected heads were dead. Other chemicals were less successful. The seed crop lost during the year of treatment was compensated for by the increased yield of almost clean seed the following year. These chemical control methods are considered to be more effective and cheaper than summer fallowing or other mechanical methods. Two applications, May 3rd and June 17th, of each chemical were made at the following rates in water at 100 gal. per acre each time: Dalapon 5 lb. (higher rates killed the grass); Amitrol 5 lb. and 10 lb. and maleic hydrazide 8 lb. and 16 lb. The higher dosage rates for the last two chemicals gave some increase in seed yield over the lower rates. D. J. Hooper

942—AYCOCK, R., 1960. "The influence of preplanting treatments of root-knot-infested gladiolus corms and row applications of nematocides on nematode control and production of corms and flowers." [Abstract of paper presented at the 1960 Annual Meeting of the Southern Division, American Phytopathological Society.] **Phytopathology, 50** (8), 574.

943—BAINES, R. C. ET AL., 1959. "Factors influencing control of the citrus nematode in the field with D-D." **Hilgardia, 29** (8), 359–381.
The authors studied the vertical diffusion pattern and efficacy of D-D in loam and silt loam soils. In tests, 120–180 U.S. gal. per acre of injected D-D killed all the citrus nematodes in the top 4 to 5 ft. of the soil. Water applied 7 to 14 days after treatment increased the level of control achieved. The opposite tended to occur with water applications immediately after treatment. Soil moisture had little effect on control, within the range of field capacity to wilting point. Thorough rolling of the surface was necessary after treatment to prevent rapid diffusion straight out of the soil. Polythene covers were even better. Control at lower depths improved with increased depth of injection, though the upper layer was therefore subject to less than 100% kill. J. E. Peachey

944—BOOGAART, K. VAN DEN & HIJINK, M. J., 1959. "Tridipam, een nieuw nematicide." **Mededelingen van de Landbouwhogeschool en de Opzoekingsstations van de Staat te Gent, 24** (3/4), 645–661. [English, French & German summaries pp. 659–660.]

The authors describe a new nematicide and fungicide based on dimethylthiuram disulphide and called Tridipam. It is broadcast as a dry powder and subsequently cultivated in moist soil, where it has a fumigant action. Effective nematode kill and crop response are claimed from differing soil types. At a rate of 20–30 gm. per sq.m. a waiting period of four to six weeks on light to medium soils is recommended at temperatures of 12°C. to 15°C. The product is irritating to skin and mucous membranes. J. E. Peachey

945—EDWARDS, B. A. B. & JANES, B. S., 1960. [ICIANZ Research Station, "Merrindale", Croydon, Victoria, Australia.] "Agricultural science in Australia 1935–1960. Plant protection." **Journal of the Australian Institute of Agricultural Science, 26** (2), 190–198.

In this general review of plant pest and disease problems and their control, nematicides are dealt with briefly. They are regarded as generally too expensive and phytotoxic for general use, and there is a real need for development of a cheap, safe nematicide for perennial crops. R. D. Winslow

946—LOOS, C. A. & LOOS, S. B., 1960. [Banana Board of Jamaica, Kingston Gardens, Kingston, Jamaica, W.I.] "Preparing nematode-free banana 'seed'." **Phytopathology, 50** (5), 383–386.

Loos & Loos state that the four banana varieties generally cultivated are susceptible to attack by nematodes especially *Radopholus similis*. These nematodes are often distributed to new plantations on infected "seed". They can be eliminated by paring all the discoloured tissues from "seed" rhizomes which are then dipped in a Nemagon-Bordeaux mixture and air-dried for 24 hours. Selection and preparation of the "seeds" for treatment is described and illustrated in detail. Field experiments show that people experienced in treating "seeds" could reduce the incidence of *R. similis* infection from 89% to 1%. Paring of Gros Michel rhizomes delayed the first fruit harvest by about two weeks; there was, however, a substantial increase in fruit yield in the 17 months from planting compared with untreated "seed". D. J. Hooper

947—MINTON, E. B., CAIRNS, E. J. & SMITH, A. L., 1960. "Effects of soil fumigants on the occurrence of nematodes in field bins." [Abstract of paper presented at the 1960 Annual Meeting of the Southern Division, American Phytopathological Society.] **Phytopathology, 50** (8), 576.

948—MINTON, E. B., CAIRNS, E. J. & SMITH, A. L., 1960. [Crops Research Division, Agricultural Research Service, USDA, Louisiana Agricultural Experiment Station, Baton Rouge, Louisiana, U.S.A.] "Effects of soil fumigants on the occurrence of nematodes in field bins." **Plant Disease Reporter, 44** (7), 479–483.

The authors describe fumigation experiments carried out in large open-bottom field bins. MC-2 [methyl bromide], Nemagon [DBCP], D-D, Dowfume 85 [EDB] and Dorlone mixture were used. The results appear to indicate that eradication of stylet nematodes, down to a considerable depth, is only possible after repeated treatments. J. E. Peachey

949—MINZ, G., 1959. [Nematode control.] **Hassadeh, 39,** 1175–1176. [In Hebrew.]

All remnants of previous crops should be removed from the land before planting. Minz gives the months in which the soil should be fumigated in Israel. The soil should be level with a good tilth and must have a moisture content similar to that for sowing. Instructions for the use of D-D, ethylene dibromide and Nemagon are given. After treatment the furrows must be covered by a plough or harrow and the soil surface sealed with a light overhead watering. Seed can be sown 10 to 14 days after fumigation. [Based on an English translation.] H. R. Wallace

950—MOTSINGER, R. E. & MORGAN, O. D., 1960. [University of Maryland, College Park, Maryland, U.S.A.] "Control of root-knot nematode and aphid on tobacco." **Plant Disease Reporter, 44** (6), 399.

In two-gallon crocks, each containing two tobacco plants growing in *Meloidogyne*-infested soil, root-knot nematodes and aphids (*Myzus* sp.) were controlled by the addition of 10 lb. or 20 lb. per acre of 0,0-diethyl 0-2 pyrazinyl phosphorothioate applied as a 5% granular material. The chemical was applied to the top four inches of soil either two weeks before planting, one week before planting, at planting or 10 days after planting. There was slight initial damage to the plants but in all treated pots the plants remained free from nematodes and aphids.

M. T. Franklin

951—NUSBAUM, C. J., 1960. "Soil fumigation for nematode control in flue-cured tobacco." **Down to Earth. Midland, Michigan, 16** (1), 15–17.

952—O'BANNON, J. H. & REYNOLDS, H. W., 1960. [Crops Research Division, Cotton Research Center, Tempe, Arizona, U.S.A.] "Preliminary studies with DBCP cotton seed treatment for controlling the root-knot nematode." **Plant Disease Reporter, 44** (7), 484–486.

O'Bannon & Reynolds describe experiments with dibromochloropropane for the control of *Meloidogyne incognita* var. *acrita*, by treating cotton seed. Good root-knot control was obtained with 1·70 lb. to 4·30 lb. technical DBCP per 21 lb. seed (the amount of seed required per acre). At high temperatures this treatment appeared to be phytotoxic. J. E. Peachey

953—PAGE, A. B. P., HAGUE, N. G. M., JAKABSONS, V. & GOLDSMITH, R. E., 1959. [Imperial College Field Station, Sunninghill, Berks, U.K.] "Fumigation of lucerne seed with methyl bromide for the control of the stem eelworm *Ditylenchus* (*Anguillulina*) *dipsaci*." **Journal of the Science of Food and Agriculture. London, 10** (9), 461–467.

From a series of fumigation tests, the authors conclude that for disinfecting lucerne seed, infected with the stem eelworm (mainly fourth larval stage) a concentration time product of 1,000 mg. per hour per litre of methyl bromide should be more than adequate. The recommended moisture content of the seed is around 12%. Variations in moisture content do not appear to affect phytotoxicity as much as with other seeds and increase in moisture may increase the susceptibility of the eelworm to the fumigant. Storage of the seed can reverse the reduction in germination produced by mild treatment. After exposure to 1,250 mg. per hour per litre, seed was used for a commercial crop which showed no significant yield reduction. The authors mention the need for work on the nature of infection spread and soil and weed carry-over. J. E. Peachey

954—PALTI, J. & MINZ, G., 1959. [Disease control of field and vegetable crops in seed beds.] **Hassadeh, 39,** 1311. [In Hebrew.]

Land chosen for seed-beds should be free from harmful soil fungi, nematodes and weeds. Where such land is unavailable the soil should be fumigated to kill these pests. During sprouting a weekly insecticide treatment is necessary to control sucking and biting insects. [Based on an English translation.] H. R. Wallace

955—PROCTOR, J. M., 1960. "Two microplot trials with Thimet against pea root eelworm." **Plant Pathology. London, 9** (2), 72–75.

From microplot trials Proctor found that Thimet would not be commercially suitable for the control of pea-root eelworm. Although when mixed with the top soil there was good crop response, the eelworm population was also increased. Nemagon was also tried.

J. E. Peachey

956—RENIUS, W., 1959. "Nematodenbekämpfung durch Fruchtfolge." **Kartoffelbau. Hamburg, 10** (8), 170–171.

Renius states that certain crops—turnips, rye and some grasses, notably red fescue ("Rotschwingel")—effectively decrease field infestations of potato-root eelworm (*Heterodera rostochiensis*). He gives examples of recommended four- and five-year rotations, and emphasizes the need to eliminate volunteer potatoes which help to perpetuate the pest. R. D. Winslow

957—SASSER, J. N., COOPER, W. E. & BOWERY, T. G., 1960. [Department of Plant Pathology, North Carolina State College, Raleigh, North Carolina, U.S.A.] "Recent developments in the control of sting nematode, *Belonolaimus longicaudatus*, on peanuts with 1,2-dibromo-3-chloropropane and EN 18133." **Plant Disease Reporter, 44** (9), 733–737.

The authors conclude, from field experiments with peanuts growing on land infested with *Belonolaimus longicaudatus*, that chemical control with DBCP or EN 18133 (organo-phosphorus compound) leads to an increase in quality and yield and a decrease in nematode infestation. Treatments applied at planting time were as effective as pre-plant treatments. Where infection was discovered in the growing crop the result indicated that side-dressing may be effective. Residue analyses and problems are mentioned. J. E. Peachey

958—SASSER, J. N. & UZZELL, Jr., G., 1960. [North Carolina Agricultural Experiment Station, Raleigh, North Carolina, U.S.A.] "Methyl bromide fumigation of *Heterodera glycines* in North Carolina." **Plant Disease Reporter, 44** (9), 728–732.

Sasser & Uzzell describe attempts to eradicate soya bean cyst nematodes with methyl bromide in an experimental chamber and test. Heavily infested soil was used as test material. The initial dose appeared to be more important than length of exposure to the gas. At higher temperatures doses could be reduced for effective kill. J. E. Peachey

959—THOMASON, I. J., VAN GUNDY, S. D. & McKINNEY, H. E., 1960. [University of California, Riverside, California, U.S.A.] "Thermotherapy for root-knot nematodes, *Meloidogyne* spp., of sweetpotato and tarragon propagating stocks." **Plant Disease Reporter, 44** (5), 354–358.

Roots of sweet-potato (*Ipomoea batata*) of the variety Velvet, severely infected with *Meloidogyne incognita* and *M. incognita* var. *acrita*, were subjected to dry-heat treatment to investigate possibilities of control by curing and storage facilities available to growers. Tests for survival of nematodes were carried out with ground roots mixed with soil which was planted with tomato seedlings. Treatment for 30 hours at 113°F. resulted in complete control of nematodes without substantially reducing the viability of roots. Temperature control must be critical and circulation adequate. Severely infected rhizomes of tarragon (*Artemisia dracunculus*) with *M. hapla* were treated in a hot-water bath at 113°F. for 25 minutes. The treatment resulted in 32% reduction in the viability of rhizomes, 40% infection of rhizomes surviving treatment. Propagation of new shoots in clean soil gave 70% nematode-free plants. The treatment allowed selection of clean propagating stock. The sensitivity of rhizomes to higher temperatures precludes their use for complete eradication of nematodes. The occurrence of *M. hapla* on tarragon is claimed as a first host record. H. Jacks

960—TURLIGINA, E. S. & VERSHINSKI, N. V., 1957. [Gelmintologicheskaya laboratoriya Akademii Nauk SSSR, Moscow.] [Use of electric current to kill soil nematodes.] **Priroda. Moscow,** Year 1957, No. 8, pp. 97–98. [In Russian.]

Turligina & Vershinski have treated soil containing gall nematodes with electric current of industrial frequency and of varying voltages. The soil was subjected to the current in glass tubes for periods ranging from a fraction of a second to several tenths of a second. It was found that the infection in cucumbers grown in treated soil was only 0% to 30% as compared with those grown in untreated soil. N. Jones

Miscellaneous

961—ANDRÁSSY, I., 1960. [Institut für Tiersystematik der Universität, Budapest, Hungary.] 'Nematologische Notizen, 8. (1) Ein Nematode (*Tobrilus* sp.) mit doppelter Vulva. (2) Berichtigung zum Gattungsnamen, *Greenenema* Andrássy, 1959." **Opuscula Zoologica. Instituti Zoosystematici Universitatis Budapestinensis, 3** (3/4), 111–116.

In a specimen of *Tobrilus* sp. from a pond in Hungary two vulvas were present, one at 40·7% and the other at 44·5% of the body length. The tail also was abnormal. The name *Greenenema* Andrássy, 1959 for the preoccupied name *Greenia* Hoeppli & Chu, 1932 falls under the synonymy of *Rogerius* Hoeppli & Chu, 1934. Hoeppli & Chu's little-known article is quoted in full from *Hong Kong Naturalist*, Supplement No. 1. R. W. Timm

962—DAVIS, D. & DEAK, J. E., 1960. [Merck Sharp & Dohme Research Laboratories, Rahway, New Jersey, U.S.A.] "An assay for the detection of nematode repellents." **Plant Disease Reporter, 44** (8), 622–624.

The free-living nematode *Panagrellus redivivus* was found to accumulate on colonies of the fungus *Fusarium oxysporum* f. *lycopersici*. Davis & Deak used this fact to devise a method for testing the repellent effect of chemicals upon nematodes. Paper discs were saturated with the chemical, dried and then placed on sterile Difco PDA. After the upper layer of the PDA had solidified a plug of *Fusarium* was placed directly over the paper disc. 24 hours later about 1,000 *P. redivivus* were placed at the centre of the petri dish. The nematodes at the Fusarium colony were counted after a further 24 hours. When compared with controls this count gave a measure of the repellent effect of the chemical. No chemicals were found which consistently repelled or attracted *P. redivivus*. H. R. Wallace

963—EMPSON, D. W., 1960. [National Agricultural Advisory Service, Wolverhampton, Staffs, U.K.] "Counting potato root eelworm cysts after Metham-sodium soil treatment." **Plant Pathology. London, 9** (2), 66–67.

Empson stresses the difficulty in routine advisory work of assessing the effect of nematicidal treatment on the cyst content of soils from glass-houses infested with *Heterodera rostochiensis*. Treated cysts usually appear quite normal externally. Staniland's criteria are used to assess the viability of the cyst content. Treated soil should not be sampled for at least two months after treatment, but a reliable estimate can often only be obtained after the elapse of a year. Similar difficulties arise after steam sterilization of soil. A. M. Shepherd

964—MOJE, W., 1959. "Pesticide activity and structure: structure and nematocidal activity of allylic and acetylenic halides." **Journal of Agricultural and Food Chemistry, 7** (10), 702–707.

Moje describes in detail the development of materials, apparatus and methods required for the estimation of dosage response curves for some allylic and acetylenic halides using larvae of the citrus nematode, *Tylenchulus semi-penetrans* as test organisms. The toxicities of these halides were found to be correlated with their reactivity in bimolecular nucleophilic displacement (S_N2) reactions, using potassium iodide in acetone as the index of reactivity. It is suggested that the mode of nematicidal activity of these halides may be through displacement reaction with some nucleophilic centre such as a sulph-hydryl or amino group. The pronounced toxicity of other compounds, e.g. isothiocyanates, would support this idea because they are also reactive in S_N2 reactions. Some of the halides do not fit into the S_N2 relationship and their toxicity is probably due to their solvolysis in water. J. E. Peachey

965—PRAMER, D. & DONDERO, N., 1957. [Agricultural Experimental Station, Rutgers University.] "Microscopic traps." **Natural History. New York, 66** (10), 540–543.

This is a popular article on nematode-trapping fungi. A. M. Shepherd

TAXONOMY

Monogenea

***966**—BIKHOVSKI, B. E., 1957. [Study of monogenetic trematodes of fish in Tadzhikistan.] **Izvestiya Vsesoyuznogo Nauchno-Issledovatelskogo Instituta Ozernogo i Rechnogo Ribnogo Khozyaistva, 42,** 109–123. [In Russian: English summary.]

967—LLEWELLYN, J., 1960. [Department of Zoology & Comparative Physiology, University of Birmingham, U.K.] "Amphibdellid (monogenean) parasites of electric rays (Torpedinidae)." **Journal of the Marine Biological Association of the United Kingdom, 39** (3), 561–589.

As a result of comparative studies of the functional morphology of the adhesive organs and the genitalia of amphibdellid parasites from various microhabitats on five species of electric rays Llewellyn proposes several taxonomic revisions. The name Amphibdellatidae is rejected for Amphibdellidae, members of which have a bifurcate unbranched intestine, two pairs of large hooks, with or without a single supporting bar in the adults, 16 persistent oncomiracidial hooklets and no eyes. The adults are parasitic on secondary gill lamellae or gill mucosae of

Torpedinidae but juveniles of some species occur in the blood. The genus *Amphibdella* differs from *Amphibdelloides* in the absence of a transverse bar supporting the hooks, in having a germarium which loops around the right intestinal limb instead of lying entirely within the intercaecal field, in the position of the vaginal opening, in having a dilatation of the vas deferens, in the shape of the copulatory sclerites and in its habitat. *Amphibdella paronaperugiae* n.sp. from the gill mucosa and blood of *Torpedo torpedo* differs from *A. torpedinis*, a parasite of *T. marmorata* in its smaller size, shape, the absence of a vaginal gland and in the size of the penis-bearing copulatory sclerites. *Amphibdelloides vallei* n.sp., parasitic on *T. marmorata* differs from *A. maccallumi*, a parasite of *T. nobiliana*, in the size, size and shape of the hooks and penis-bearing copulatory sclerite, the absence of a fibrous pad near the vaginal opening, and the origin of the vagina from the anterior instead of the posterior end of the receptaculum seminis which is spherical in shape. Revised specific diagnoses are given for *Amphibdella torpedinis*, *A. flavolineata*, *Amphibdelloides maccallumi* and *A. narcine*. Llewellyn states that there is strong evidence for believing that juvenile development in *Amphibdella* involves a protandrous form living endoparasitically in the blood system of the host. Speculations are made on the phylogeny of the Amphibdellidae. H. H. Williams

968—ROBINSON, E. S., 1960. [University of Nebraska, U.S.A.] "A study of some monogenetic trematodes from marine fishes." **Dissertation Abstracts, 20** (11), 4468–4469.
[Although one new genus and species and nine new species are reported from New Zealand fishes, and two new species are reported from Puget Sound fishes, no names or descriptions are given.]

969—THOMAS, J. D., 1957. "A new monogenetic trematode, *Diplozoon ghanense* sp.nov. (Polyopisthocotylea: Discocotylea) from a West African freshwater fish *Alestes macrolepidotus* (C. & V., 1849), in West Africa." **Journal of the West African Science Association, 3** (2), 178–182.
Thomas describes and illustrates *Diplozoon ghanense* n.sp. from the gills of *Alestes macrolepidotus* in the Black Volta River. This is the first species of the genus to be found on a member of the Characidae. The clamps in the opisthaptor of the two individuals in permanent copula are in four rows, each with four clamps, the intestine does not bifurcate and the testes are compact and lie in the region of fusion. S. Willmott

Digenea

970—CHING, H. L., 1960. [Agricultural Experiment Station, College of Agriculture, University of Hawaii, Honolulu 14, Hawaii.] "Some digenetic trematodes of fishes of Friday Harbor, Washington." **Journal of Parasitology, 46** (2), 241–249, 250.
Ching records 24 species of digenetic trematodes from 21 species of marine fishes. *Fellodistomum brevum* n.sp. from *Microstomus pacificus* differs from *F. profundum* and *F. furcigerum* in having larger testes and shorter caeca; its eggs are larger than those of *F. profundum* measuring 46 μ to 53 μ by 21 μ to 26 μ and it differs from *F. furcigerum* in having a sucker ratio of 1 : 2 instead of 1 : 1·67. *Opechona parvosoma* n.sp. from *Sebastodes melanops* can be separated from *O. bacillaris* and *O. occidentalis* by its short body, an inconspicuous external seminal vesicle and a short excretory bladder which reaches only to the testes. *Podocotyle sinusacca* n.sp. from *Leptocottus armatus* is distinguished from *P. endophrysi* in having separate testes and a constricted seminal vesicle, the constriction being folded and overlapping the posterior lobe of the vesicle. 38 new host records are given for 16 species of Digenea. Ching states that of the 42 species of Digenea recorded from fishes in the Friday Harbor area 23 have been found in other regions, their greatest affinities being with those from fishes caught in the North Atlantic and Japanese waters. H. H. Williams

971—COIL, W. H. & KUNTZ, R. E., 1960. [Department of Zoology, University of Nebraska, Lincoln, Nebraska, U.S.A.] "Trematode parasites of vertebrates of East Pakistan." **Transactions of the American Microscopical Society, 79** (3), 281–286.
Coil & Kuntz describe *Genarchopsis macrocotyle* n.sp. from *Ophicephalus punctatus*, and *Acanthostomum pakistanensis* n.sp. from *Hydrophis cyanocinctus*. *G. macrocotyle* closely resembles *G. ovocauda* and *G. piscicola*, also from the same host, but can be differentiated from

them by its small size (one-fourth to one-half the length of the other two) and possession of suckers which are larger than those of the others. *A. pakistanensis* resembles *A. burminis*, but the latter has cephalic spines all of the same length and its egg is more than twice as long as that of *A. pakistanensis*. *A. pakistanensis* is differentiated from *A. indicum* by its possession of small cephalic spines and of a differently shaped egg. Other species found and commented on were: *Pleurogenes sawanensis*, *Ganeo tigrinum*, *G. kumaonensis* and *Mehraorchis tigrinarum* from *Rana tigrina*; *Allocreadium handiai* and *Asymphylodora indica* from *Ophicephalus punctatus*; and *Opisthorchis caninus* from the domestic cat. (All hosts were collected in the vicinity of Dacca, East Pakistan). E. I. Sillman

972—DOBBIN, Jr., J. E., 1958. [Centro de Pesquisas Aggeu Magalhães, Recife, Brazil.] "*Glypthelmins vitellinophilum* sp.n., parasito de *Hyla raniceps* (Cope) (Trematoda, Plagiorchidae)." **Memorias do Instituto Oswaldo Cruz, 56** (1), 153–161.

Dobbin describes a new plagiorchid trematode *Glypthelmins vitellinophilum* n.sp. parasitic in the small intestine of *Hyla raniceps*. This new species is most closely related to *G. palmipedis* (Lutz, 1928) from which it is distinguished by the different relative diameters of the suckers, by differences in the structure of the cirrus sac and by the greater anterior and posterior extent of the vitelline glands. C. A. Wright

973—DOLLFUS, R. P. & TIMON-DAVID, J., 1960. "Sur une larve de distome, parasite de têtards de *Rana esculenta* L., devenant adulte chez le chat domestique *Felis catus* L. *domest.* et le pigeon domestique *Columba livia* Gmel. *domest.*" **Comptes Rendus des Séances de l'Académie des Sciences. Paris, 250** (10), 1909–1911.

Dollfus & Timon-David describe and illustrate *Massaliatrema gyrinicola* n.g., n.sp., metacercariae of which were found in *Rana esculenta* tadpoles near Marseilles. Adults were obtained experimentally in small numbers in cats and in greater numbers in pigeons. It is concluded that this species is the same as that reported by Joyeux *et al.* as *Euryhelmis squamula* [for abstract see Helm. Abs., **3,** No. 335a]. It resembles *Metagonimoides* most closely but differs from *M. oregonensis* (the only species of this genus) in the position of the ventral sucker, uterus, seminal vesicle, ovary and seminal receptacle. N. Jones

974—ETGES, F. J., 1960. [Department of Biological Sciences, University of Cincinnati, Ohio, U.S.A.] "On the life history of *Prosthodendrium* (*Acanthatrium*) *anaplocami* n.sp. (Trematoda: Lecithodendriidae)." **Journal of Parasitology, 46** (2), 235–240.

Etges describes *Prosthodendrium* (*Acanthatrium*) *anaplocami* n.sp. from experimentally infected mice. The new species is distinguished from others in the genus by complete body spination, and form, position and spine arrangement of the genital atrium. *Anaplocamus dilatatus* and *Hexagenia bilineata* were ascertained from natural and experimental infections to be the first and second intermediate hosts respectively of the new species. Life-history stages are described and illustrated. The genus *Acanthatrium* Faust, 1919 having been suppressed, Etges transfers *A. amphidymum* Cheng, 1957 and *A. oligacanthum* Cheng, 1957 to the genus *Prosthodendrium* Dollfus, 1931, subgenus *Acanthatrium* Skarbilovich, 1948. E. I. Sillman

975—FERNANDES, J. C., 1958. [Inspetoria Regional de Defesa Sanitaria Animal, Fortaleza, Ceará.] "Notas sôbre algumas espécies do género *Gorgoderina* Looss, 1902 (Trematoda, Gorgoderidae)." **Memorias do Instituto Oswaldo Cruz, 56** (1), 1–23.

Fernandes describes two new species of *Gorgoderina* and presents redescriptions of *G. parvicava* Travassos, 1922 (placed in the subgenus *Gorgorimma* Pigulevsky), *G. diaster* Lutz, 1926 and *G. rochalimai* Pereira & Cuocolo, 1940 (both placed in a new subgenus *Metagorgoderina* characterized by having the vitelline glands so deeply lobed that they are broken up into separate follicles). *G. permagna* Lutz, 1926 is placed in the synonymy of *G. parvicava*. Both the new species are placed in *Metagorgoderina*, *G. pigulevskyi* [spelt *pigulesvskyi* in the heading of the description but *pigulevskyi* elsewhere] is a new name for the material referred to *G. permagna* by Pigulevsky, it is distinguished from *G. diaster* by having the vitelline glands divided into only five or six follicles and by having the anterior testis in the front half of the body and the posterior in the back half. *G. carioca*, from *Leptodactylus ocellatus*, is distinguished from *G. diaster* by the larger size of the ventral sucker relative to the oral, by having the ovary in

the anterior third of the body and the testes in the anterior half, also by the larger size of the eggs. It is distinguished from *G. rochalimai* by the position of the testes and by the larger size of the eggs. C. A. Wright

976—ITO, J., 1960. [Hygiene Laboratory, Faculty of Education, Shizuoka University, Shizuoka, Japan.] "Contributions to the morphology of cercariae obtained from a snail host, *Semisulcospira libertina* in Japan." **Japanese Journal of Medical Science and Biology, 13** (1/2), 59–72.

Cercaria pseudodivaricata Faust, 1924, *C. innominatum* Faust, 1924, *C. redicola* Faust, 1924 and *C. creta* Faust, 1924 are redescribed and classified. *C. chromatocerca* n.sp. is described. It is a zygocercaria characterized by its body size, flame cell formula and tail coloration. Ito proposes a new name, *Cercaria monostyloides* n.sp. for a tailless cercaria previously inadequately described and named *Cercariae XVII* Nakagawa, 1915, *Cercaria E* Yoshida, 1917 and *Cercaria XIII* Ando, 1918. He also describes *Cercaria F* Ueno, Ishii & Abe, 1930 and renames it *C. manei* n.sp. B. L. James

977—MANTER, H. W. & PRITCHARD, M. H., 1960. [Department of Zoology, University of Nebraska, Lincoln, Nebraska, U.S.A.] "Additional hemiurid trematodes from Hawaiian fishes." **Proceedings of the Helminthological Society of Washington, 27** (2), 165–180.

Duosphincter zancli n.g., n.sp. from *Zanclus canescens* (L.) differs from members of the genera *Aphanurus, Ahemiurus* and *Myosaccium* in possessing well developed sphincter muscles in the oral sucker and acetabulum and in the tubular winding shape and pre-acetabular position of the seminal vesicle. *Aponurus acanthuri* n.sp. from *Acanthurus sandvicensis* differs from *Aponurus synagris* in that the caeca extend behind the uterus, the vitellaria are horizontally arranged and the eggs are smaller. *Genolinea lobata* n.sp. from *Acanthurus sandvicensis* resembles *G. manteri* but differs in having a smaller sucker ratio, smaller eggs, a more anterior seminal vesicle and an embedded oral sucker. In *Lecithocladium chingi* n.sp. from *A. mata* a very long pars prostatica, extending posteriorly almost to the ovary distinguishes it from all other species of the genus. In body size, egg size, location of the ecsoma invagination and proximity of the seminal vesicle to the acetabulum *L. chingi* resembles *L. magnacetabulum. Lecithochirium spiravesiculatatum* n.sp. from *Gymnothorax undulatus* can be separated from all other species of *Lecithochirium* by the coiled posterior region of the prostatic vesicle. *Sterrhurus cirrhiti* n.sp. from *Cirrhitus alternatus* resembles *S. lotellae* in the presence of a thick-walled anterior region of the seminal vesicle and the rounded muscular cirrus sac but differs from it in the size of the oral sucker and eggs, position of the genital pore and acetabulum and the length of the vitelline lobes and caeca. The following synonyms are proposed: *Parectenurus* Manter, 1947, synonym of *Ectenurus*; *Uterovesiculurus* Skryabin & Gushanskaya, 1954, synonym of *Erilepturus*; *Lecithaster sayori* Yamaguti, 1938, synonym of *L. stellatus* Looss, 1907. The following new combinations are proposed: *Ectenurus americanus* (Manter, 1947) for *Magnacetabulum americanum*; *E. leiognathi* (Yamaguti, 1953) for *M. leiognathi*; *Erilepturus platycephali* (Yamaguti, 1934) for *Ectenurus platycephali.* H. H. Williams

978—NASIR, P., 1960. [Parasitology Laboratory, Wayne State University, Department of Biology, Detroit, Michigan, U.S.A.] "A new stylet-cercaria, *C. edgbastonensis* from *Lymnaea stagnalis* (L.)." **Proceedings of the Helminthological Society of Washington, 27** (2), 124–126.

Cercaria edgbastonensis n.sp., an xiphidiocercaria of the Polyadenous group, is characterized by its size, the shape and size of the stylet and the size of the suckers. It has short intestinal caeca and the main tubes of the excretory system arise terminally from the horns of the excretory vesicle. This cercaria encysts in open water, in snails and in *Chironomus* larvae. B. L. James

979—PRUDHOE, S., 1956. [Department of Zoology, British Museum (Natural History), London, S.W.7, U.K.] "On a new trematode from South African fishes." **Annals and Magazine of Natural History,** Series XII, **9** (97), 72–75.

Prudhoe describes a new trematode, *Aephnidiogenes rhabdosargi* n.sp. from three specimens collected from two examples of the yellow-fin bream (*Rhabdosargus sarba*) caught in Durban Bay, South Africa. The species is distinguished from the other members of the genus, viz., *A. barbarus* and *A. major* by the shape of the body, the possession of separate male and female pores and the distribution of the vitelline follicles. M. M. Sarwar

980—SPARKS, A. K. & THATCHER, V. E., 1960. [College of Fisheries, University of Washington, Seattle, Washington, U.S.A.] "A new species of *Crassicutis* (Trematoda, Allocreadiidae) from a sparid fish (*Archosargus probatocephalus*) in the Northern Gulf of Mexico." **Transactions of the American Microscopical Society, 79** (3), 341–342.

Sparks & Thatcher describe *Crassicutis archosargii* n.sp. from *Archosargus probatocephalus*, Grand Isle, Louisiana. The new species is most like *C. marina* Manter 1947, but differs from it in being considerably longer and possessing larger eggs and a smaller oral sucker and acetabulum. A table setting out the differential characteristics of *C. archosargii*, *C. marina* and *C. cichlasomae* is given. [No figure accompanies this paper, due apparently to a printer's omission.]

E. I. Sillman

981—THOMAS, J. D., 1957. "A new species of the genus *Allocreadium* (Trematoda: Allocreadiidae) from a freshwater fish, *Alestes macrolepidotus*, in West Africa." **Journal of the West African Science Association, 3** (1), 1–9.

Thomas describes and figures *Allocreadium voltanum* n.sp. from the intestine of *Alestes macrolepidotus* in the Black Volta River. The new form is distinguished from other species of the genus by the following combination of characters: the ventral sucker considerably larger than the oral, the vitellaria extending from the posterior extremity to the level of the anterior margin of the ventral sucker, the position of the ovary midway between the ventral sucker and the anterior testis, the wide intertesticular space, the short oesophagus and the small pharynx. It is considered doubtful that *A. oncorhynchi* Eguchi should be included in *Allocreadium*.

S. Willmott

Cestoda

982—CZAPLIŃSKI, B., 1960. [Zakład Parazytologii, Polska Akademia Nauk, Warszawa, Pasteura 3, Poland.] "Anatomia i cykl rozwojowy tasiemca *Hymenolepis vistulae* sp.n. (Hymenolepididae Furhmann, 1907) pasożyta tracza nurogęsi—*Mergus merganser* L." **Acta Parasitologica Polonica, 8** (8/20), 299–314. [French summary pp. 312–314.]

Hymenolepis vistulae n.sp. from *Mergus merganser* shot near Warsaw is described and illustrated. The characters of the strobila are taken from stained specimens of the material which lacked scoleces, and that of the scolex from fully formed cysticercoids obtained on experimental infection of *Cyclops strenuus strenuus* (successful in 80%). *H. vistulae* differs from the two nearest species parasitizing *M. merganser*, *H. parviceps* and *Hymenofimbria merganseri*, chiefly in the longer, diorchid type hooks (15 μ to 16·5 μ long), the longer cirrus (the total length of the proximal armed and distal unarmed sections is 315 μ to 375 μ) and the pattern of the genital glands (testes in a triangle, one on either side of the ovary and one in front of it). From *Hymenolepis yukonensis*, *H. barrowensis*, *H. arctica* and *H. fructicosa*, the new species is differentiated by a combination of the above characters and the size of the strobila (length 266 mm. to 288 mm. maximum width 2·16 mm. to 2·26 mm.), the testes, which are rounded or transversely oval, the usually three-lobed ovary and the vitelline gland, which is transversely elongate or faintly lobed.

G. I. Pozniak

983—DEBLOCK, S. & CAPRON, A., 1959. [Laboratoire de Parasitologie, Faculté de Médecine de Lille, France.] "*Bertiella lemuriformis* nouveau cestode Anoplocephalidae d'un lémurien de Madagascar (*Lichanotus laniger* Gmel.)." **Parassitologia. Rome, 1** (2), 97–111.

After surveying the taxonomic position of *Bertiella*, Deblock & Capron describe the first tapeworm of this genus to be found in lemurs, *B. lemuriformis* n.sp. from *Lichanotus laniger*. A nearly complete specimen has an estimated length of 80 mm. and comprises 500 segments. Typically anoplocephalid in structure, four scoleces measure 320 μ to 390 μ in diameter, with suckers 130 μ to 210 μ in diameter; the lateral genital pores are irregularly alternating, the young uterus has the form of a transverse tube and the eggs, diameter 35 μ to 40 μ, have a typical pyriform apparatus. Characteristic of *Bertiella* are the sessile suckers, the vagina with its sleeve of glandular cells and medium-sized cirrus pouch, which in *B. lemuriformis*

measures 300 μ × 150 μ and contains an internal seminal vesicle and unarmed cirrus. The genital ducts pass dorsal to the excretory vessels, there are 40 to 50 testes and the female organs are slightly poral in position. The gravid uterus ruptures laterally to release the eggs. *B. lemuriformis* is compared with *B. studeri* (Blanchard, 1891), *B. congolensis* Baer & Fain, 1951, *B. hamadryadis* (Pierantoni, 1928), all from primates, and a cestode described by Meggitt, 1927 as *B. fallax*. There are eight figures, one table and 18 references. J. Mahon

984—GAROIAN, G. S., 1960. [Department of Zoology, Southern Illinois University, U.S.A.] "*Schistocephalus thomasi* n.sp., (Cestoda: Diphyllobothriidae) from fish-eating birds." **Proceedings of the Helminthological Society of Washington, 27** (2), 199–202.

Garoian describes *Schistocephalus thomasi* n.sp. from the small intestine of *Larus argentatus* Pont. and *Sterna hirundo* L. from Lake Michigan, Michigan, U.S.A. The new species is described as 46 mm. to 90 mm. long by 3·8 mm. to 6 mm. broad but the number of segments present is not given; bothria are lacking, functional genitalia are present from the 16th or 17th segment backwards, except for the terminal segment, the testes number about 300 per segment, and the coiled vas deferens lies dorsal to the uterus and extends ventrally to open into the seminal vesical, whereas in *Schistocephalus solidus* it lies ventral to the uterus and close to the seminal vesicle; also the wall of the anteriorly placed seminal vesicle is thin and poorly muscularized whilst in *S. solidus* it is thick and muscular, the cirrus sac measures 150 μ to 180 μ in diameter, a seminal receptacle which is present in *S. solidus* is absent, and the eggs measure 54 μ to 60 μ by 35 μ to 40 μ. [Although Garoian distinguishes *S. thomasi* from *S. solidus* he does not mention *S. pungitii* Dubinina, 1959 or *S. nemachili* Dubinina, 1959; for abstract see Helm. Abs., **29,** No. 783]. The discussion includes references to previous records of *Schistocephalus* in North America. I. C. Williams

985—JOHRI, G. N., 1960. [Zoology Department, University of Lucknow, India.] "Studies on some cestode parasites. V. Two new species of cestodes belonging to the family Hymenolepididae Fuhrmann, 1907." **Journal of Parasitology, 46** (2), 251–255.

Johri describes a new species *Hymenolepis minimedius* from the bat *Pteropus medius* Temm. from India, characterized by an unarmed rostellum. This is the first record of a *Hymenolepis* from an Indian bat. Johri distinguishes his specimens from the only other unarmed species from bats, *H. grisea* (van Beneden, 1873) and from *H. citelli* McLeod, 1933 and *H. rhodesiensis* Baer, 1933, also unarmed but not from bats. The second new species *Diorchis balacea* is from a bird *Fulica atra* L. in India. These specimens resemble *Diorchis spinata* Mayhew, 1929, *D. visayana* Tubangui & Masiluñgan, 1937 and *D. spiralis* Szpotanska, 1931, but are distinguished from them by the number and size of the rostellar hooks, size and extent of the cirrus pouch and the absence of a vaginal sphincter. There are two full-page figures and six references. J. Mahon

986—SPASSKI, A. A., 1960. [The life-cycles of two cestodes from *Neomys fodiens*.] **Dokladi Akademii Nauk SSSR, 135** (5), 1285–1287. [In Russian.]

From a study of the literature Spasski concludes that the two cestode larvae described by Hamann (1891) from *Gammarus pulex* as *Taenia integra* n.sp. and *Taenia bifurca* n.sp. are respectively the larvae of *Hymenolepis polycantha* Baer, 1931 and *H. triodontophora* Sołtys, 1954. *H. polycantha* thus becomes a synonym of *T. integra* which Spasski now transfers to *Coronocanthus* as *Coronocanthus integra* (Hamann, 1891) Spasski, 1960 n.comb. Similarly *H. triodontophora*, which falls in synonymy with *T. bifurca* had been transferred by Prokopic (1957) to *Vampirolepis* and by Yamaguti (1959) to *Triodontolepis* as type species, now becomes *Triodontolepis bifurca* (Hamann 1891) Spasski, 1960 n.comb. *Hymenolepis anacetabulata* is considered a synonym of *Coronocanthus integra* on the supposition that the reported difference in the size of its hooks could be merely intraspecific and that the suckers could have been overlooked in a withdrawn scolex. On this basis also *Acotylolepis* Yamaguti, 1959 is made a synonym of *Coronocanthus*. N. Jones

Acanthocephala

987—HOLLOWAY, Jr., H. L., 1958. "Notes on the helminths of mammals in the Mountain Lake region. Part 3. The genus *Centrorhynchus* in North America, with the description of a new species." **Virginia Journal of Science, 9** (2), 221–232.

Centrorhynchus wardae n.sp. is described on the basis of five specimens from an Allegheny spotted skunk (*Spilogale putorius*). *C. wardae* is separated from other North American species of the genus by having 34 to 36 rows of hooks. A key to the species of *Centrorhynchus* from North America and a tabular comparison of these species is included. On the basis of the analysis of stomach contents, it is suggested that the skunk probably became infected by eating *Ambystoma* spp. W. L. Bullock

Nematoda

988—AKHTAR, S. A., 1958. [West Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Lahore.] "On the nematodes (family Oxyuridae Cobb, sub-family: Labiostominae n.subf.) parasitic in the pika of Alaska—Part II." **Pakistan Journal of Scientific Research, 10** (2), 56–62.

Akhtar describes two new species of *Cephaluris* from the Alaska pika, *C. collaris* n.sp. and *C. alaskensis* n.sp. *C. collaris* is considered distinct in having an enlarged lower cloacal lip supported by a pair of pedunculate papillae and in having a relatively short buccal cavity, oesophagus and tail in both sexes. *C. alaskensis* closely resembles *C. hashmi* Akhtar, 1956 but differs in having five fine longitudinal ridges on the ventral surface of each side of the caudal alae and in having six long glands surrounding the anterior end of the oesophagus. The genus *Cephaluris* is diagnosed and is considered distinct in having a pair of cuticular shields on the dorsal side of the head. A key is given to the species of the genus *Cephaluris* and the summary also covers Part I of this paper published in **Pakistan J. Scient. Res., 8,** 133–139 [for abstract see Helm. Abs., **25,** No. 482b]. W. G. Inglis

989—ANDERSON, R. C. & BENNETT, G. F., 1960. [Department of Parasitology, Ontario Research Foundation, Toronto, Canada.] "*Eufilaria mcintoshi* n.sp. from *Padda oryzivora* (L.)." **Proceedings of the Helminthological Society of Washington, 27** (2), 113–115.

Anderson & Bennett describe *Eufilaria mcintoshi* n.sp. from the subcutaneous tissue in the region of the legs of the Java Sparrow (*Padda oryzivora*) in Java (imported to St. Thomas, Ontario). The species is readily distinguished by the spicules, which are relatively large in relation to the caudal extremity, caudal swellings are present on the male, the vulva is posterior to the oesophagus, the spicules taper over their posterior halves, the anus in the female is subterminal, the anterior end is not bulbous and the microfilariae have blunt tails. The microfilariae failed to develop in *Aedes aegypti.* W. G. Inglis

990—ANDRÁSSY, I., 1959. [Institut für Tiersystematik der Universität, Budapest, Hungary.] "Nematoden aus dem Psammon des Adige-Flusses, I." **Memorie del Museo Civico di Storia Naturale di Verona, 7,** 163–181.

20 nematode species of 12 genera were obtained from water at a depth of 30 cm., 0·5 m. to 1·5 m. from the bank of the Adige River near Verona. Eight species are new records for Italy. Two new species are described and figured. *Theristus ruffoi* n.sp. is nearest to *T. (Penzancia) maior* but differs in the much smaller body, more posterior amphids, more anterior vulva, narrower tail, etc. *Theristus* has not previously been found in such a biotope. *Mononchus italicus* n.sp. is close to *M. maduei* but the body is significantly smaller, the ovary is unpaired and the stoma wall bears no cross striations. R. W. Timm

991—ANDRÁSSY, I., 1960. [Institut für Tiersystematik der Universität, Budapest, Hungary.] "Einige Nematoden aus Afghanistan." **Opuscula Zoologica. Instituti Zoosystematici Universitatis Budapestinensis, 4** (1), 3–14.

Three species of free-living nematodes collected in a mountainous area of Afghanistan are described and figured. *Dorylaimus afghanicus* n.sp. is nearest to *D. carinatus* but differs in the larger body size, the relatively shorter female tail, the more anterior vulva, more anterior

widening of the oesophagus and the lesser number of subventral papillae in the male. *Eudorylaimus lindbergi* n.sp. is nearest to *E. consobrinus* but differs in the presence of prominent "inner lips", shorter spear aperture, more posterior widening of the oesophagus, unsclerotized vulvar lips and the shorter rectum. *Eudorylaimus* sp. is similar to *E. lindbergi* in main characters but differs in small details. R. W. Timm

992—ANDRÁSSY, I., 1960. [Institut für Tiersystematik der Universität, Budapest, Hungary.] "*Panagrobelus topayi* n.sp., eine neue Nematoden-Art aus Kenya." **Zoologischer Anzeiger, 164** (5/6), 195–198.

Panagrobelus topayi n.sp. is described and figured from soil in Kenya. It differs from other species in the presence of distinct sclerotized cheilorhabdions, a very large telostom, a relatively large cuticular annulation, two subdivided lateral lines, thickened vulvar lips, a long rectum, and an attenuated tail in the female. R. W. Timm

993—BRENES, R. R. & BRAVO HOLLIS, M., 1959. [Instituto de Biología, Facultad de Microbiología, Universidad de Costa Rica, San José, Costa Rica, A.C.] "Helmintos de la República de Costa Rica VIII. Nematoda 2. Algunos nemátodes de *Bufo marinus marinus* (L.) y algunas consideraciones sobre los géneros *Oxysomatium* y *Aplectana*." **Revista de Biología Tropical. Universidad de Costa Rica, 7** (1), 35–55. [English summary p. 46.]

Brenes & Bravo Hollis give redescriptions of four nematode species from *Bufo marinus marinus*, not previously recorded from Costa Rica. The four species are: *Oxysomatium itzocanensis* (Bravo, 1947); *Rhabdias sphaerocephala* Goodey, 1924; *Oswaldocruzia subauricularis* (Rudolphi, 1819); and *Ochoterenella digiticauda* Caballero, 1944. The authors accept that *Aplectana* Railliet & Henry, 1916 is a synonym of *Oxysomatium* Railliet & Henry, 1913 and refer *Aplectana corti* López-Neyra, 1947, *A. lopesi* da Silva, 1955 and *A. pharyngeodentata* Belle, 1957 to *Oxysomatium* as new combinations. [Inglis considers *A. pharyngeodentata* to be indistinguishable from *Spinicauda* (*Moaciria*) *icosiensis*; for abstract see Helm. Abs., **30,** No. 195.] W. G. Inglis

994—BRZESKI, M., 1960. "Drei neue freilebende Nematoden aus Polen." **Bulletin de l'Académie Polonaise des Sciences. Classe II. Série Sciences Biologiques, 8** (6), 261–264.

Brzeski describes and figures *Mononchus sphagni* n.sp. which differs from *M. vorax* in its smaller stoma, position of vulva and longer tail, and *Eudorylaimus silvaticus* n.sp. which differs from *E. carteri* in the size of the spear, from *E. modestus* in the larger body, shorter tail, larger spear aperture and position of vulva, and from *E. brevis* in the shorter tail, smaller spear opening and longer prerectum. *Witoldinema* n.g., a new dorylaim, is characterized by six inner lips surrounding the stoma and fine transverse striation on the cuticle. *W. stefanskii* n.sp., the type, is described and figured. [The six inner lips suggest affinities with *Labronema* but there are not enough details to make comparison possible.] J. B. Goodey

995—CAMERON, T. W. M. & MYERS, B. J., 1960. [Institute of Parasitology, McGill University, Macdonald College P.O., Que., Canada.] "*Manistrongylus meyeri* (Travassos, 1937) gen.nov., and *Necator americanus* from the pangolin." **Canadian Journal of Zoology, 38** (4), 781–786.

Cameron & Myers report on some nematodes from a pangolin (*Manis pentadactyla pentadactyla*) in Formosa, which are referable to two species, *Manistrongylus* [=*Trichoskrjabina*] *costata* (Travassos, 1937) n.g., n.comb. [but this is preoccupied by *Manistrongylus* Baer, 1959, see abstract No. 1029 below] and *Necator americanus*. Both species are redescribed. The new genus contains only one species, *M. meyeri* (Travassos, 1927)=*Trichoskrjabinia costata* (Meyer, 1896)—*Trichostrongylus* (s.l.) *meyeri* Travassos, 1937=*Strongylus costata* Meyer, 1896 *nec* Rudolphi, 1819; it is characterized by the complex form of the spicules—each is split into a thin tapering shaft and a thicker part ending in a hook and a complex spicular membrane is present—and the structure of the bursa. It is argued that *N. americanus* must be considered a normal parasite of the pangolin. W. G. Inglis

996—CAMPANA-ROUGET, Y. & PAULIAN, P., 1960. "Mise en synonymie de deux espèces de *Contracaecum*, parasites de mammifères marins." **Annales de Parasitologie Humaine et Comparée, 35** (1/2), 191–192.

Campana-Rouget & Paulian describe specimens from an *Arctocephalus* sp. which fully agree with the description of *Contracaecum corderoi* Lent & Freitas, 1948. They point out that there are no reliable characters by which that species can be distinguished from *C. ogmohini* Johnston & Mawson, 1941 and consider the two names synonymous, *C. ogmohini* having priority.

W. G. Inglis

997—CARVALHO, J. C., 1957. "*Rotylenchus elisensis*—nova espécie associada com raízes de soja." **Revista do Instituto Adolfo Lutz. São Paulo, 17,** 43–46. [English summary pp. 44, 46.]

Rotylenchus elisensis n.sp. is described and figured. It is unique in the genus in possessing a short, tapering arcuate tail in each sex. The details of the junction of oesophagus and intestine were not clear, the bursa does not reach the tail tip, the vulva is at 73% and the gonads are relatively little developed. [These data suggest affinities in *Rotylenchulus* though the position of the orifice of the dorsal oesophageal gland is against this.] J. B. Goodey

998—CARVALHO, J. C., 1959. [Instituto Biológico de São Paulo, Brazil.] "*Helicotylenchus elisensis* n.comb. (Nematoda: Tylenchidae)." **Arquivos do Instituto Biológico. São Paulo, 26,** 45–48. [English summary pp. 47–48.]

Carvalho, following the classification of the subfamily Hoplolaiminae by Andrássy, 1958 [for abstract see Helm. Abs., **27,** No. 48g], makes the new combination *Helicotylenchus elisensis* (Carvalho, 1958)—synonym *Rotylenchus elisensis* Carvalho, 1958 [1957 according to the reprint of the paper, see preceding abstract]. A new description based on fresh material is made and the female is newly figured. The lateral fields have four incisures and are not areolated; the lip region has four to five annules; the tails of both sexes are conoid, ventrally arcuate with 20 to 22 annules; the male tail is enveloped by a rudimentary bursa; the stylet is 18 μ to 22 μ long with the outlet of the dorsal oesophageal gland about 18 μ behind the stylet base; the junction of the oesophagus and the intestine is obscure. [As in this redescription the dorsal gland opening into the oesophagus is clearly shown as being situated one stylet length behind the stylet, it is very likely that this is a species of *Rotylenchulus*.] D. J. Hooper

999—CHAKRAVARTY, G. K. & MAJUMDAR, G., 1960. [Department of Zoology, University of Calcutta, Calcutta, India.] "On the classification of the nematode family Camallanidae Railliet and Henry, 1915." **Indian Journal of Helminthology, 12** (2), 93–94.

Chakravarty & Majumdar divide the family Camallanidae Railliet & Henry, 1915 into two subfamilies, namely, Camallaninae, characterized by paired buccal valves and tridents and with three genera *Camallanides*, *Paracamallanus* and *Camallanus* and Neocamallaninae n.subf., characterized by a continuous buccal capsule and no tridents, with two genera *Neocamallanus* and *Procamallanus*. Keys are given to the genera within each subfamily. [See also Yeh, 1960, **J. Helminth., 34,** 117–124, where a similar division of the family is made.] W. G. Inglis

***1000**—EVRANOVA, V. G., 1957. [*Habronema petrowi* n.sp., a new nematode from the intestine of *Ciconia nigra* L.] **Uchenie Zapiski Kazanskogo Veterinarnogo Instituta, 65,** 245–247. [In Russian.]

1001—GOODEY, J. B., 1960. [Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, England.] "*Rhadinaphelenchus cocophilus* (Cobb, 1919) n.comb., the nematode associated with 'red-ring' disease of coconut." **Nematologica, 5** (2), 98–102. [German summary p. 102.]

Aphelenchoides cocophilus is placed in a new genus as *Rhadinaphelenchus cocophilus* (Cobb, 1919) n.comb. and is redescribed from fresh material. The nematode is exceedingly long and narrow (a≃100), very lithe in water and is characterized by a flap-like terminal bursa in the male and vulval flap in the female. J. B. Goodey

1002—GOODEY, J. B., 1960. [Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, England.] "The classification of the Aphelenchoidea Fuchs, 1937." **Nematologica, 5** (2), 111–126. [German summary p. 124.]

The Aphelenchoidea are considered to be composed as follows: Aphelenchidae—*Aphelenchus*; Aphelenchoididae—*Aphelenchoides*, *Seinura*, *Megadorus* n.g., *Tylaphelenchus*, *Laimaphelenchus*, *Bursaphelenchus*, *Cryptaphelenchus*, *Cryptaphelenchoides* n.g., *Ektaphelenchus*, *Parasitaphelenchus*, *Peraphelenchus* and *Entaphelenchus*; Paraphelenchida n.grad.—*Paraphelenchus* and *Metaphelenchus*; Anomyctidae n.fam.—*Anomyctus;* Sphaerulariidae—*Sphaerularia*, *Tripius*, *Proatractonema* and *Scatonema*. A brief diagnosis is given of each group and a list of species in each genus. There is also a list of *genera* and *species inquirendae*. *Megadorus* n.g. is created for *Aphelenchoides megadorus* Allen, 1941, characterized by the massive spear with large basal nobs and the shape of the oesophagus. *Cryptaphelenchoides* n.g. contains *A. macrobulbosus* Rühm, 1956 and resembles *Cryptaphelenchus* Rühm but has an offset head and a post-vulval sac. J. B. Goodey

1003—GOODEY, J. B. & SEINHORST, J. W., 1960. [Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, England.] "Further observations and comments on the identity of *Rotylenchus robustus* (de Man, 1876) Filipjev, 1934 with a description of a proposed neotype and a new definition of *Rotylenchus goodeyi*." **Nematologica, 5** (2), 136–148. [German summary pp. 147–148.]

The authors do not agree with the contention of Loof & Oostenbrink (1958) that *Rotylenchus robustus* (de Man, 1876) and *Hoplolaimus uniformis* Thorne, 1949 are the same species. Under the International Rules of Zoological Nomenclature *Tylenchus robustus* de Man, 1876 is the type of the genus *Rotylenchus* Filipev, 1936 and Filipev's citation of *T. robustus* de Man, 1880 has no other meaning nomenclatorially than *T. robustus* de Man, 1876. *T. robustus* as described by de Man in 1876 differs in several ways (body length, spear length, form of tail and habitat) from *H. uniformis* and thus is not the same species. Several specimens have been collected from the type locality of *T. robustus* de Man, 1876 (clayey meadow soil near Leiden) which agree closely with de Man's description of 1876 (e.g. body length, spear length and form of tail) and from these a neotype has been described. *Anguillulina robusta* of T. Goodey, 1932 is considered to be the same as *Rotylenchus robustus* (de Man, 1876). *A. robusta* of T. Goodey, 1940 and 1951 is not identical with *R. robustus* (de Man, 1876) and remains *R. goodeyi* Loof & Oostenbrink, 1958. *R. robustus* of Thorne, 1949 is identical neither with *R. robustus* (de Man, 1876) nor with *R. goodeyi* Loof & Oostenbrink. J. B. Goodey

1004—GRUNDMANN, A. W. & FRANDSEN, J. C., 1960. [Department of Zoology and Entomology, University of Utah, U.S.A.] "*Capillaria bonnevillei* n.sp., (Nematoda: Trichuridae) from the Ord kangaroo rat in Utah." **Proceedings of the Helminthological Society of Washington, 27** (2), 206–208.

Grundmann & Frandsen describe *Capillaria bonnevillei* n.sp. from the duodenum of the Ord kangaroo rat (*Dipodomys ordii marshalli*) at Stansbury Island, Great Salt Lake, Tooele County, Utah. The species is similar to *C. americana* Read, 1940 to which it keys out in Read's key, but differs in having an armed instead of an unarmed spicule sheath, bilobate papillae on the caudal lobes of the male rather than simple papillae, and apparently lacks bacillary lines. W. G. Inglis

1005—GUPTA, S. P., 1960. [Institute of Parasitology, McGill University, Macdonald College P.O., Que., Canada.] "Nematode parasites of vertebrates of East Pakistan. VI. *Amplicaecum cacopi*, *Thelandros* sp., *Rhabdias ranae*, and *Oswaldocruzia melanosticti* sp.nov., from frogs." **Canadian Journal of Zoology, 38** (4), 745–750.

Gupta describes *Amplicaecum cacopi* from *Rana tigrina* and records some variation in the distribution of the caudal papillae of the male, *Thelandros* sp. from *R. cyanophlyctis* (of which only one female was found and it is impossible to refer it to a species) and *Rhabdias ranae* is redescribed from the lungs of *R. tigrina*. *Oswaldocruzia melanosticti* n.sp. is described from the small intestine of *Bufo melanosticus* (type host) and *R. tigrina*. The new species is characterized by the lack of cervical alae or a cephalic inflation and by the form of the spicules, "the terminal portions of which divide into three spike-like processes which are curved into hook-like processes". W. G. Inglis

1006—HAYASHI, S., 1960. [Department of Parasitology, Institute for Infectious Diseases, University of Tokyo, Japan.] "Description of a new frog filaria, *Icosiella sasai* n.sp. with redescription of an allied species, *Icosiella kobayashii* [*kobayasii*] Yamaguti, 1941." **Japanese Journal of Experimental Medicine, 30** (1), 1–12.

Icosiella sasai n.sp. was found in the thigh muscle of *Babina subaspersa* at Amami-Oshima Island, Kagoshima Prefecture, Japan. Some immature specimens were also recovered from the body-cavity. A description is given of the adult, immature stage and microfilaria. *I. sasai* differs from the three previously known species of the genus in the relative shortness of the oesophagus, (1: 2·8 relative to body length), the relatively short muscular portion of the oesophagus, the relatively anterior position of the vulvar opening (0·492 mm. to 0·535 mm. from the head), and the great length of the body (99 mm. to 107 mm.). *I. kobayasii* Yamaguti, 1941 is reported from the thigh muscles of *Rana limnocharis* at Amami-Oshima and the adult and microfilaria are redescribed. W. G. Inglis

1007—INGLIS, W. G., 1957. [British Museum (Natural History), Cromwell Road, London, England.] "A revision of the nematode genera *Kathlania* and *Tonaudia*." **Annals and Magazine of Natural History,** Series XII, **10** (119), 785–800.

Inglis has re-examined the type series of the three species which are included in the genera *Kathlania* and *Tonaudia* and has transferred *K. chiloscyllii* Thwaite, 1927 to *Tonaudia*. The genera are redefined, thus: *Kathlania* Lane, 1914 (*K. leptura* (Rudolphi, 1819)) buccal cavity triangular in cross section; pharyngeal teeth dissimilar; spicules complex. *Tonaudia* Travassos, 1918 (*T. tonaudia* (Lane, 1914) and *T. chiloscyllii* n.comb.) buccal cavity hexagonal in cross section; pharyngeal teeth similar; spicules simple. The value of measurements in the delimitation of the three species is considered and the effect of contraction or elongation of the body on ratios of lengths is considered in detail. Evidence is presented which suggests that the value of any ratio in any specimen is a factor of the total length of the specimen. W. G. Inglis

1008—INGLIS, W. G., 1960. [Department of Zoology, British Museum (Natural History), London, England.] "Les nématodes de la famille des Maupasinidae." **Annales de Parasitologie Humaine et Comparée, 35** (1/2), 190–191.

Inglis reports that *Dubioxyuris macroscelidis* Ortlepp, 1937 and *Maupasina weissi* Seurat, 1913 are indistinguishable. *Dubioxyuris* falls as a synonym of *Maupasina*. It is pointed out that although *M. weissi* is a somewhat aberrant species it is clearly referable to the superfamily Subuluroidea but that a distinct family Maupasinidae (Lopez-Neyra, 1945 subfam.) nom.nov. for Dubioxyuridae Ortlepp, 1937 should be retained for its reception. W. G. Inglis

1009—INGLIS, W. G., 1960. [Zoology Department, British Museum (Natural History), London, England.] "Further observations on the comparative anatomy of the head in the nematode family Subuluridae: with the description of a new species." **Proceedings of the Zoological Society of London, 135** (1), 125–136.

Inglis describes *Subulura ortleppi* n.sp. from the (?) caecum of *Rhabdomys pumilio* (type host) and *Rattus namaquensis* in Cape Province, Union of South Africa. The species is characterized by six lip lobes, a buccal cavity which is circular in cross section, pharyngeal lobes helically arranged and spicules which bear barbs on their posterior ends. It is argued that lobed mouth openings have appeared, independently, four times within the family Subuluridae and that they improve the efficiency of the mouth as a gripping organ. It is further argued that with the development of the lip lobes the pharyngeal portions have become more cuticular to act as a triturating mechanism. *Subulura indica* Khera, 1956 is considered a synonym of *Tarsubulura perarmata* (Ratzel, 1868), *Subulura vulpis* Khera, 1956 of *Oxynema alata* (Mazhar, 1933), *S. armata* Vuylsteke, 1957 is referred to the genus *Allodapa* as a new combination, and the subfamily Leipoaneminae Chabaud, 1957 is accepted for *Leipoanema* Johnston & Mawson, 1942. W. G. Inglis

1010—KLOSS, G. R., 1959. [Instituto Oswaldo Cruz, Rio de Janeiro, D.F., Brazil.] "Nematóides parasitos de um Hydrophilidae bromelícola." **Revista Brasileira de Biologia, 19** (3), 265–270.

Zonothrix gladius n.sp., *Itaguaiana dollfusi* n.g., n.sp. and *I. bromelicola* n.sp. were found in the hind gut of *Coelostoma leuderwaldi* Knisch (Coleoptera: Hydrophilidae) collected near

Itaguai, Brazil. All three species are described and figured in detail but differential characteristics are not given for *Z. gladius*. It is mentioned, however, that in the female of this species the number of eggs in the uterus is much less than in other species of the genus. The new genus, *Itaguaiana*, is characterized by the spine-like tail of the male, the long and slender spicule, the large oesophagus, and smooth-shelled eggs. In *I. dollfusi*, the type species, the cuticular annulations are limited to the oesophageal region and the tail length of the female is 0·128 mm. to 0·180 mm. In *I. bromelicola*, of which the male is unknown, the cuticular annulations in the female extend over the entire length of the body and the tail length is 0·309 mm. to 0·408 mm. H. E. Welch

1011—KUROCHKIN, Y. V., 1960. [Astrakhanski gosudarstvenni zapovednik, U.S.S.R.] [The nematode *Heterotylenchus pawlowskyi* n.sp. castrating fleas, carriers of plague.] **Dokladi Akademii Nauk SSSR, 135** (5), 1281–1284. [In Russian.]

Kurochkin describes and illustrates *Heterotylenchus pawlowskyi* n.sp. which parasitizes the fleas *Coptopsylla lamellifer* and *Ceratophyllus laeviceps* in the Astrakhan district during the whole period of their metamorphosis and causes their castration. The spicules (0·013–0·0157 mm.) are shorter than those of *H. aberrans*. The parthenogenetic female (0·6–0·82 mm.) is about half the length of *H. aberrans* and considerably shorter than in *H. stammeri*. In the sexual generation the male tail is shorter and the female is more than twice as long as in *H. stammeri*, *H. wülkeri* or *H. bovieni* while the stylet (0·008–0·001 mm.) is larger than in these three species and in *H. aberrans*. N. Jones

1012—LOOF, P. A. A., 1960. [Plantenziektenkundige Dienst, Wageningen, Netherlands.] "Taxonomic studies on the genus *Pratylenchus* (Nematoda)." **Tijdschrift over Plantenziekten, 66** (2), 29–90. [Dutch summary p. 86.]

This is a lengthy work in which the genus *Pratylenchus* is discussed in detail. Loof creates a neotype for the type species *P. pratensis* from the type locality and designates the neotype of Sher & Allen (1953) [for abstract see Helm. Abs., **22,** No. 417b] holotype of *P. crenatus* nom.nov. *P. pratensis* now has the sense of *P. helophilus* Seinhorst, 1959 as the latter is made a synonym. *P. irregularis* n.sp. is erected for *P. pratensis* of Paetzold, 1955; it differs from *P. pratensis* in having a more irregular female tail and from *P. goodeyi* in the number of head annules. *P. minyus* Sher & Allen is made a synonym of *P. neglectus* (Rensch, 1924) Chitwood & Oteifa, 1952 and the reasons for so doing are discussed. *P. loosi* n.sp. is made for *P. coffeae* of Loos, 1953 and is distinguished from *P. coffeae* (Zimmermann, 1898) T. Goodey, 1951 by its more slender body, more posterior vulva and the tail shape. Loof consigns to species inquirendae *P. pratensis* var. *tenuistriatus* Meyl, 1953, *P. pratensis* var. *bicaudatus* Meyl, 1954 and *Tylenchus* (*Chitinotylenchus*) *coffeae* var. *brevicauda* Rahm, 1928. J. B. Goodey

1013—MAWSON, P. M., 1958. [University of Adelaide, South Australia.] "Free-living nematodes. Section 2: Additional Enoploidea from Antarctic stations." **Report Series. B.A.N.Z. Antarctic Research Expedition, 1929–31, 6B** (13), 293–305.

Additional species of marine nematodes from various Antarctic stations are reported, and many new species are described and figured. *Thoracostoma* (*T.*) *parasetosum* n.sp., based on one juvenile, is similar to *T. setosum* but ocelli are absent [for abstract of description of males see No. 1014 below]. *Thoracostoma* (*T.*) *schizoepistylium* n.sp. is 20 mm. long; there are six pre-anal papillae and the posterior border of the head capsule is obscure. *T.* (*Pseudocella*) *polychaites* n.sp. is close to *T. panamaense* but the cervical setae are more posterior and numerous and the amphid is smaller. *Phanodermopsis ingrami* n.sp. is close to *P. groenlandicum* but the body and cephalic setae are longer and the excretory pore is more posterior. *Halalaimus* (*H.*) *brachyaulax* n.sp. is distinguished by a very short and posterior amphid. *H.* (*Tycnodora*) *diacros* n.sp. is distinguished by transverse striations and a bifid tail tip. *Viscosia wieseri* n.sp. is listed but described in Section 3 [see No. 1014 below]. *Metoncholaimus haplotretos* n.sp. is characterized by its very short cephalic setae and single external pore of the demanian system. New names include: *Anticoma wieseri* nom.nov. for *A. stekhoveni* Mawson, 1956 *nec* Wieser, 1953; and *Phanoderma* (*P.*) *banzare* nom.nov. for *P. steineri* Mawson, 1956 *nec* Ditlevsen, 1919. R. W. Timm

1014—MAWSON, P. M., 1958. [University of Adelaide, South Australia.] "Free-living nematodes. Section 3: Enoploidea from Subantarctic stations." **Report Series. B.A.N.Z. Antarctic Research Expedition, 1929-31, 6B** (14), 307–358.

Mawson reports on a large collection of free-living marine nematodes from subantarctic waters. Many new species are described and figured. *Thoracostoma* (*Pseudocella*) *brachychaites* n.sp. is near *T. saveljevi* but lacks ocellar pigment. *Anticoma kerguelenensis* n.sp. is near *A. columba* but is distinguished by amphid size, tail length, and position of the pre-anal supplement. *Halalaimus* (*H.*) *marri* n.sp. differs from *H. zenkevitshi* and *H. scleratus* in the length of the cephalic setae. *H.* (*H.*) *fletcheri* n.sp. is near the previous species but has shorter setae and spicules and lacks a pre-anal seta in the male. *H.* (*Tycnodora*) *macquariensis* n.sp. is marked by the absence of a gubernaculum. A key to the species *Halalaimus* is given. *Enoplus heardensis* n.sp. is distinguished by amphid size, the position of the amphids and ocelli, and the form of the male copulatory apparatus. *Mesacanthion kerguelenense* n.sp. is close to *M. infantilis* and *M. virilis* but the amphid is small and circular and the pre-anal organ is at the head of the spicules. *Oxyonchus subantarcticus* n.sp. is distinguished from *O. australis* by head proportions, tail shape, and copulatory apparatus. *Epacanthion brevispiculosum* n.sp. differs from *E. microdentatus* in head morphology and tail length. *Paramesacanthion allgeni* n.sp. is distinguished by the length of the spicule in relation to tail size and by the position of the pre-anal supplement. *Enoploides kerguelenensis* n.sp. is close to *E. paralabiatus* but is stouter and has shorter labial setae. *Oncholaimus leptos* n.sp. is very close to *O. brachycercus* but the tail is longer and differently shaped. *Oncholaimium paredron* n.sp. resembles *O. longus* but differs in the length and shape of the tail and the position of the demanian pore. *Viscosia brevicaudatus* n.sp. is characterized by the extremely short blunt tail. *V. wieseri* n.sp. is separated from *V. abyssorum* by the amphid width and from *V. halstromi* by the spicule size. *Metaparoncholaimus macrouraios* n.sp. has poorly developed teeth; a key to the genus is given. *Metoncholaimus thysanouraios* n.sp. differs from *M. brevispiculum* in demanian values. *Ledovitia fallae* n.sp. is close to *L. profunda*. *Calyptronema* (*Dilaimus*) *mawsoni* n.sp. is near *C. denticulatum* but has a shorter tail and smaller male amphid. The males of *Thoracostoma* (*Thoracostoma*) *parasetosum* are described; the absolute lengths of spicule and gubernaculum are less than in *T. setosum* and the worms are shorter.

R. W. Timm

1015—MAWSON, P. M., 1960. [Zoology Department, University of Adelaide, South Australia.] "Nematodes belonging to the Trichostrongylidae, Subuluridae, Rhabdiasidae, and Trichuridae from bandicoots." **Australian Journal of Zoology, 8** (2), 261–284.

Mawson describes seven new species of parasitic nematodes from bandicoots from various localities in Queensland, South Australia, Victoria and Tasmania and erects three new genera. *Nicollina iota* n.sp. from *Isoodon obesula* and *Perameles nasuta* is characterized by small ventrolateral teeth in the buccal cavity and the form of the dorsal ray. *Austrostrongylus acinocercus* n.sp. from *P. nasuta* is characterized by the apparently single tooth in the buccal cavity and the shape of the tail with a small symmetrical bursa, ill-defined dorsal lobe and short lateral lobes. *Peramelistrongylus skedastos* n.g., n.sp. is from *I. obesula*, *Perameles nasuta* and *P. gunni* (type host: *I. obesula*). The genus is characterized as a group within the subfamily Graphidiinae, not possessing a gubernaculum, but in having pre-bursal papillae, no cervical papillae, the mode of origin of the dorsal ray and the form of the ovejectors, the anterior being distinctly longer than the posterior. Three forms of the species are reported differing in the form of the excretory pore, the detailed form of the dorsal ray, the form of the vulva and the distribution of the alae which flank the vulva. *Mackerrastrongylus* n.g. is characterized as a genus of the subfamily Anoplostrongylinae most similar to *Fontesia* Travassos and *Pholidostrongylus* Baer but differing in the form of the spicules which are relatively short and complex. The type species, *Filarinema peramelis* Johnston & Mawson, 1938 is briefly redescribed and recorded from the type host, *I. obesula*, and from *Perameles nasuta*. *Asymmetracantha tasmaniensis* n.g., n.sp. is described from *I. obesula* (type host) and *P. nasuta*. The genus is referred to the subfamily Anoplostrongylinae and is characterized by the form of the cephalic hooks which resemble those of *Biacantha* but differ in having a slight connection with the simple buccal ring. *Labiobulura baylisi* n.sp. from *I. obesula*, is characterized by 12 lips, the head being constricted just below the lips and by the radial lobes being only slightly twisted. *L. inglisi*

n.sp. from *I. obesula*, *I. nauticus* and *Perameles gunni*, is characterized by 12 lips, very cuticularized peripheral lobes and the shape of the chordal and radial lobes. *Parastrongyloides australis* n.sp. from *I. obesula* and *Perameles gunni* is characterized by its large size, two pairs of caudal papillae, a median papilla and two longitudinal rows of ten small papillae anterior to the cloacal opening in the male and in the size of the eggs, 0·045 mm. to 0·050 mm. by 0·025 mm. It is otherwise similar to *Parastrongyloides peramelis* Mackerras, 1959. In addition various comments and brief descriptive remarks are made on: *Nicollina* sp.—one male from *I. obesula*; *Austrostrongylus* sp.—one male from *I. obesula*; *Labiobulura peragale* (Johnston & Mawson, 1940)—the presence of only six lips is confirmed; *L. peramelis* (Baylis, 1930) is recorded from *I. obesula* and it is pointed out that the records of this species from *Perameles nasuta* (Johnston & Mawson, 1939) and *I. obesula* (=*I. torosus*) (Johnston & Mawson, 1951) actually refer to *L. baylisi* n.sp.; *Trichuris peramelis* Baylis, 1932 is reported from *I. obesula*; *Capillaria* sp. is reported from *I. obesula* and *P. gunni*. W. G. Inglis

1016—PIECZYNSKA, E., 1960. "*Tobrilus vistula* n.sp. (Nematoda, Tripylidae)." **Bulletin de l'Académie Polonaise des Sciences, Classe II. Série Sciences Biologiques,** 8 (6), 249–251.

Tobrilus vistula n.sp. is described and figured. It is characterized by being one of the largest species in the genus, L=3·1 mm., and the most elongated, a=48–55. The buccal capsule is large, thick-walled, calyciform and the oesophagus pocket walls bear two large teeth. The passage between the buccal capsule and the oesophagus pocket is rather wide. The male tail is shorter than the female tail with five large pre-anal papillae. The amphids are inconspicuous, calyciform with an oval orifice. This species is closest to *Tobrilus medius* (Schneider) Andrássy, from which it differs in body shape, amphid size, one oesophagus pocket, narrowly spaced teeth and arrangement of male papillae. The specimens were found in water samples from the Vistula near Warsaw. D. J. Hooper

1017—ROMANIKO, V. I., 1960. [Chelyabinski pedagogicheski institut, U.S.S.R.] [A new nematode species from leguminous crops in southern Ural.] **Zoologicheski Zhurnal, 39** (8), 1256–1257. [In Russian: English summary p. 1257.]

Pratylenchus globulicola n.sp. is described and figured from *Pisum sativum* in southern Ural. The new species is nearest to *P. pratensis* but differs from it by the chitinous thickenings on the head (there are four rings), the stylet is only 12 μ to 14 μ long and is fused into a swelling at its base, there are three paired chitinous point-like thickenings (0·7 μ long) in the wall of the anterior end of the oesophageal bulb, the excretory pore lies well below the nerve ring, the spicule heads are of a characteristic shape, the posterior uterus is considerably shorter than the width of the body at the level of the vulva, and the female tail is smooth. Males and females are found in equal numbers and the eelworms are not present on the stems, leaves or flowers. G. I. Pozniak

1018—ROMANOV, I. V., 1960. [Gorkovski gosudarstvenni meditsinski institut, U.S.S.R.] [*Capillaria sibirica* n.sp. from *Eutamias sibiricus*.] **Zoologicheski Zhurnal, 39** (5), 766–768. [In Russian: English summary p. 768.]

Romanov describes and illustrates *Capillaria sibirica* n.sp., of which 40 specimens were found in the small intestine of one out of six chipmunks (*Eutamias sibiricus*) examined in the Krasnoyarsk Territory, U.S.S.R. It differs from all other *Capillaria* spp. from mammals in having a cuticular spicule sheath membrane dilated at the end where it emerges from the body, in the spicule sheath within the membrane being long and coiled, and in the ends of the spicules being hook-shaped. N. Jones

1019—SANWAL, K. C., 1960. [Nematology Section, Entomology Research Institute, Research Branch, Canada Department of Agriculture, Ottawa, Canada.] "Taxonomic position of *Macrolaimus papillatus* (Rahm, 1928) Goodey, 1951, status of *Diastolaimus* Rahm, 1928, and emended diagnoses of Chambersiellidae and *Chambersiella* Cobb, 1920 (Nematoda)." **Canadian Journal of Zoology, 38** (4), 751–753.

Sanwal refers *Diastolaimus papillatus* Rahm, 1928 to the genus *Chambersiella* Cobb, 1920—thus removing it from *Macrolaimus* to which genus it was referred by Goodey (1951)—because of the presence of hook-like rhabdions, a long, narrow, vase-like posterior stomatal region,

the posterior position of the amphids and the shape of the male tail. The diagnoses of the family Chambersiellidae (Thorne, 1937) Sanwal, 1957 and of the genus *Chambersiella* Cobb, 1920 are emended to include forms with simple hair-like cephalic setae and a post-vulvar uterine branch. A key is given to the three species of the genus *Chambersiella*: *C. rodens* Cobb, 1920 (type species), *C. bakeri* Sanwal, 1957 and *C. papillatus* n.comb. W. G. Inglis

1020—SIDDIQI, M. R., 1960. [Department of Zoology, Aligarh Muslim University, Aligarh (U.P.), India.] "*Telotylenchus*, a new nematode genus from North India (Tylenchida: Telotylenchinae n.sub-fam.)." **Nematologica, 5** (2), 73–77. [German summary p. 77.]

Siddiqi erects Telotylenchinae n.subf. with the type genus *Telotylenchus* n.g. and also to contain *Pseudhalenchus* Tarjan, 1958. The new subfamily is characterized by the cylindrical, elongate, annulated body with incised lateral fields, the hexaradiate cephalic framework with little or no sclerotization, the median oesophageal bulb being well developed with a distinct valvular apparatus; the elongate oesophageal glands extend back over the anterior end of the intestine and lie free in the body-cavity; the nucleus of the dorsal oesophageal gland is located posterior to the subventral gland nuclei; the ovary is single or paired; the testis is single, a bursa is present, and the spicula and gubernaculum are tylenchoid. Telotylenchinae is closest to Tylenchinae from which it differs by the absence of a basal oesophageal bulb. *Telotylenchus indicus* n.g., n.sp. is described and figured. The lip region is annulated, the stylet is well developed but the labial framework is not sclerotized; the female tail is elongate and conoid with a blunt terminus, the vulva is near median, the ovaries are paired, opposed and outstretched. The male tail is pointed and completely enveloped by a bursa. The pore-like phasmids are situated in the tail. D. J. Hooper

1021—SINGH, K. S. & SINGH, K. P., 1958. [Department of Zoology, The University, Lucknow, India.] "On some nematodes from invertebrates." **Records of the Indian Museum,** Year 1955, **53** (1/3), 37–51.

Two new oxyuroids, *Leidynemella periplaneticolae* and *Bulhõesia thapari*, are described from the cockroach, *Periplaneta americana* L.; three new species, *Gryllocola gryllotalpae*, *G. indicus*, and *Gryllophila khehariae*, and a known species, *Talpicola talpicola* Basir, 1942, are recorded from the mole cricket, *Gryllotalpa africana* Beauv., collected at Lucknow. Keys are given to four species of *Leidynemella*, and three of *Bulhõesia* which is emended. *Mirzaiella* Basir, 1942 is made a synonym of *Gryllocola* Basir, 1942, which is also emended. H. E. Welch

1022—TIMM, R. W. & AMEEN, M., 1960. Notre Dame College, Dacca 2, East Pakistan.] "*Nygellus subclavatus*, a new species of free-living soil nematode." **Pakistan Journal of Biological and Agricultural Sciences, 2** (2), 1–2.

Nygellus subclavatus n.sp. from soil around the roots of pineapple at Dacca, East Pakistan, is described and figured. It is characterized by the short subclavate tail; the *c* value is 34. R. W. Timm

1023—VUYLSTEKE, C., 1956. "Note sur quelques nématodes parasites avec description de neuf espèces nouvelles." **Revue de Zoologie et de Botanique Africaines, 53** (3/4), 441–477.

Vuylsteke reports on a collection of nematodes from the Belgian Congo and the Antwerp Zoo. There is a total of 82 records from 48 hosts, Members of the Trichuridae, Trichostrongylidae, Strongylidae, Diaphanocephalidae, Ancylostomidae, Syngamidae, Metastrongylidae, Ascaridae, Heterocheilidae, Oxyuridae, Subuluridae, Heterakidae, Spiruridae, Rictulariidae, Thelaziidae, Gnathostomidae, Acuariidae and Filariidae from primates, carnivores, ungulates and a bird are cited. One new genus, eight new species and a new variety are described. They are: *Probstmayria vesiculata* n.sp. from *Pan satyrus schweinfurthi* differing from all other members of the genus by possessing a cephalic vesicle; *Molinofilaria schoutedeni* n.g., n.sp. from *Cercopithecus mona wolfi* is close to *Molineus* Cameron, 1923 but lacks a cephalic vesicle; *Metathelazia congolense* n.sp. from *Genetta* sp. is close to *M. oesophagea* Gerichter, 1948 but differs in having two pre-anal and three post-anal papillae and in the length of the spicules (180 μ); *Porrocaecum herpestum* n.sp. from *Herpestes ichneumon* is characterized by possessing slightly trilobed lips and lacking intermediate lips; *Spirura congolense* n.sp. from *Crossarchus alexandri* resembles *S. marayani* Mirza & Basir, 1939 but differs in the dimensions of the

eggs ($42\mu \times 20\mu$) and the distribution of post-anal papillae in the male; *Protospirura congolense* n.sp. from *Ichneumon albicauda* differs from *P. gracilis* Cram, 1924 by being shorter (18 mm. long) yet having a longer oesophagus (4·57 mm.); *Paraspidodera sellsi* Morgan, 1927 var. *zadi* n.var., from *Potamochoerus porcus*; *Toxocara manzadiensis* [recorded in the host list on p. 476 as "*Toxocara vitulorum* sp.n."] from *Bos caffer* [a differential diagnosis is not given]; and *Acuaria dartevellei* n.sp. from *Philantomba monticola* distinguished by having straight anastomosing cuticular head cordons instead of the usual undulating ones. Several new host records are made. W. M. Fitzsimmons

1024—VUYLSTEKE, C., 1957. "Nématodes. Parasites d'oiseaux." **Exploration du Parc National de la Garamba (Mission H. de Saeger)**, Fasc. 8, 20 pp.

Vuylsteke describes and illustrates the following new nematodes from birds in the Garamba National Park: *Subulura armata* n.sp. in *Coliuspasser macroura macroura*, *Thelazia lissotis* n.sp. in *Lissotis melanogaster melanogaster*, *Hamatospiculum africanum* n.sp. in *Bubo africanus cinerascens*, *Serratospiculum congolensis* n.sp. in *Butastur rufipennis*, *Pelecitus anhingae* n.sp. in *Anhinga rufa rufa*, *P. polamaetus* n.sp. in *Polamaetus bellicosus* and *Pelecitus ardeae* n.sp. in *Ardea goliath*. 14 other species found are annotated. S. Willmott

1025—WELCH, H. E., 1960. [Entomology Research Institute for Biological Control, Research Branch, Canada Department of Agriculture, Belleville, Ontario, Canada.] "*Hydromermis churchillensis* n.sp. (Nematoda: Mermithidae) a parasite of *Aedes communis* (DeG.) from Churchill, Manitoba, with observations of its incidence and bionomics." **Canadian Journal of Zoology, 38** (3), 465–474.

The taxonomy and life-history of *Hydromermis churchillensis* n.sp. are given with an account of host damage and reaction by the larval, pupal and adult stages of the mosquito, *Aedes communis*. Percentage parasitism and the distribution of the nematode at Churchill, Manitoba is also recorded. H. E. Welch

1026—WELCH, H. E., 1960. [Entomology Research Institute for Biological Control, Research Branch, Canada Department of Agriculture, Belleville, Ontario, Canada.] "The taxonomy of *Hydromermis contorta* (Linstow, 1889) Hagmeier, 1912, and its synonym *Hydromermis rivicola* Corti, 1902, (Nematoda: Mermithidae) with notes on some diagnostic characters." **Nematologica, 5** (2), 92–97. [German summary p. 96.]

The controversy surrounding *Mermis contorta* Linstow, 1889 and Kohn's (1905) emendations is reviewed, a syntype was re-examined, and the combination *Hydromermis contorta* (Linstow, 1889) Hagmeier, 1912, accepted as valid. *H. rivicola* Corti, 1902, is made a synonym of *H. contorta* which becomes the type species. Three of the four termini found by Kohn were recognized in English material. The spiculum appears to be formed by the fusion of two spicules. H. E. Welch

Hirudinea

1027—LUKIN, E. I. & EPSHTEIN, V. M., 1960. [Kharkovski zootekhnicheski institut, U.S.S.R.] [Endemic leeches of the family Glossiphoniidae in Lake Baykal.] **Dokladi Akademii Nauk SSSR, 131** (2), 457–460. [In Russian.]

Lukin & Epshtein have studied the Glossiphoniidae endemic in Lake Baykal. They give a detailed definition of the genus *Baicaloclepsis* and a full, illustrated description of *B. grubei*. A preliminary description of this genus and species has apparently been given by the authors in 1959. *Clepsine echinulata* Grube is redescribed and transferred to *Baicaloclepsis*. This species differs from *B. grubei* principally by having a smaller body, better developed dorsal papillae and ventral papillae and lacking eyes although according to Grube eyes are present. However, it is possible that one of Grube's specimens was in fact *B. grubei*. *B. grubei* figures apparently in the work of Dogel and Bogolepova as *Haementeria echinulata*. The description of *Torix* (?) *baicalensis* Shchegolev is supplemented. It is not finally decided whether this species belongs to *Torix*. It is pointed out that *Baicaloclepsis*, *Torix*, *Oligobdella* and *Oligoclepsis* should all be included into Haementeriinae; (*Oligobdella* and *Oligoclepsis* were mistakenly placed by Autrum 1936 in the Glossiphoniinae). In the future it may be necessary to place these genera in a new subfamily. Of the four genera *Baicaloclepsis* is the most primitive. N. Jones

1028—LUKIN, E. I. & EPSHTEIN, V. M., 1960. [Kharkovski zootekhnickeski institut, U.S.S.R.] [The leeches of the subfamily Toricinae n.subf. and their geographical distribution.] **Dokladi Akademii Nauk SSSR, 134** (2), 478–481. [In Russian.]

Lukin & Epshtein describe Toricinae n.subf. which is distinct in the Glossiphoniidae in having two ring-somites. This step has been founded on preliminary observations, on the authors' studies of *Torix cotylifer* and of *Oligobdella orientalis* (new to the U.S.S.R.) and on bibliographical data. Other special characteristics of the new subfamily are: (i) the position of the proboscis opening near the anterior extremity of the buccal sucker; (ii) the form of the diverticula of the stomach; and (iii) geographical distribution. This subfamily includes *Paratorix* n.g., a preliminary description of which has already been given by the authors. The other genera comprising the subfamily are *Baicaloclepsis*, *Oligoclepsis*, *Torix* and *Oligobdella*. [See also abstract No. 1027 above.] N. Jones

Miscellaneous

1029—BAER, J. G., 1959. [Université de Neuchâtel, Neuchâtel, Switzerland.] "Helminthes parasites." **Exploration des Parcs Nationaux du Congo Belge. Mission J. G. Baer—W. Gerber (1958). Brussels,** Fasc. 1, 163 pp.

In this study of an extensive collection of helminths from animals in the National Parks of the Belgian Congo, Baer records 81 species from 97 of the 183 hosts examined. The absence of helminths from "ombrettes" and jacanas and of cestodes from the Lake Edward *Barbus* is noteworthy. 22 new forms are described and illustrated and *Aspidogaster limacoides* from *Barbus* sp. in Lake Edward is a new record for Africa. *Mesostephanus parappendiculatus* n.sp. from *Pelecanus rufescens* is distinguished from *M. appendiculatus* by the small ovary, the ventral sucker being larger than the oral and the enlargement of the anterior part of the body. *Prolobodiplostomum garambense* n.g., n.sp. from *Dendromus pumilio lineatus* resembles *Neodiplostomum* but possesses a genital bulb and an ejaculatory pouch. *Trematoleipsis gerberi* n.g., n.sp. from *Osteolaemus tetraspis* occupies a position intermediate between *Clinostomum* (which it resembles in the V-shaped excretory vessel) and *Opisthophallus* (which it resembles in having a uterus with two loops). *Mesorchis denticulatus* var. *nilotica* n.var. from *Larus cirrocephalus* differs from *M. denticulatus* in that the vitelline glands occupy the whole space between the posterior testis and the hind end of the body. *Petasiger inopinatum* n.sp. from *Hagedashia hagedash* is distinct in the genus in having 33 collar spines. *Choerocotyle epuluensis* n.g., n.sp. from *Hylochoerus meinertzhageni* resembles *Brumptia* and *Gastrodiscus* in the presence of an anterior pharyngeal sphincter and *Watsonius* in the presence of an oesophageal bulb and the tandem arrangement of the testes; there is no cirrus pouch. *Brachylecithum ndeleleensis* n.sp. was collected from *Hirundo abyssinica unitatis*; the status of related forms from Hirundinidae is discussed. *Lyperosomum sarothrurae* n.sp. from *Sarothrura pulchra* is the first species of the genus recorded from a bird in Africa. *Olssoniella megalocotyle* n.sp. from *Apus caffer streubeli* is very close to *O. olssoni* and *Brachydistomum salebrosum* but in the new form the vitellaria form large follicles and occupy a small lateral field immediately behind the ovary. *Platynosomum rutshurensis* n.sp. from *A. caffer streubeli* closely resembles *Platynosomum clathratum* but is smaller and the ratio of the oral to ventral sucker is 1: 2·2. *P. verschureni* n.sp. from *Crocidura occidentalis kivu* is near *P. soricis* but differs in the sucker ratio (1: 1·6 in *P. verschureni*, 1: 1·3 in *P. soricis*), and the larger size of the cirrus pouch; it is the only species in the genus in which the vitellaria reach the anterior border of the ventral sucker. *Rutshurutrema acanthodes* n.g., n.sp. from *C. occidentalis kivu* approaches *Opisthioglyphe* in its morphology but is far from it in its habitat in the gall-bladder, the two cacca do not reach the end of the body, the testes are elongate, lobed and not contiguous and the excretory vesicle is V-shaped. *Allocreadium indistinctum* n.sp. from *Barbus* sp. is distinguished from other members of the genus by the relative proportions of the suckers, the size of the cirrus pouch, the distribution of the vitellaria and the large eggs. *Metagonimus congolensis* n.sp. from *Pelecanus rufescens* is the first species of *Metagonimus* found in Africa. *Paranoplocephala acanthocirrosa kivuensis* n.subsp. from *Otomys kempi* has 60 to 65 testes per proglottis and the cirrus pouch measures 215 μ to 367 μ long by 45 μ to 123 μ in diameter. *Anomotaenia pici* n.sp. from a woodpecker (*Campothera* sp.?) resembles *Choanotaenia brevis*, *C. crateriformis*

and *Liga brasiliensis* (all parasites of Piciformes) but differs from the first two in the form of the hooks and the last in the arrangement of the genital ducts and the number of proglottides in the strobila. *Echinorhynchotaenia medici* n.comb. and *E. ficticia* n.comb. are proposed for *Taenia medici* and *Weinlandia ficticia* respectively. *Parvitaenia magna* n.sp. from *Ibis ibis* is easily differentiated from the two other species of the genus by its large size and the number and form of the hooks. *Pseudandrya suricattae* n.comb. and *Vitta parvirostris* n.comb. are proposed for *Hymenolepis suricattae* and *Paricterotaenia parvirostris* respectively. *Monopylidium guiarti africanum* n.subsp. from *Hemiparra crassirostris* differs from the type subspecies in the large size of the hooks. *Onderstepoortia vanellorum* n.sp. from *Afribyx senegallus lateralis* and *Stephanibyx lugubris* is intermediate between *O. taeniformis* and *O. tringae* in the size of the hooks but has far fewer testes (about 40). *Paruterina vesiculigera* and *P. javanica* are transferred to *Notopentorchis* as new combinations. *Hymenolepis verschureni* n.sp. from *Geochelidon nilotica* and *Chlidonias hybrida* possesses a sacculus accessorius but may be distinguished from *H. octacanthoides* and *H. multiglandularis* by the hooks. *Nephridiacanthus gerberi* n.sp. from *Manis* (*Smutsia*) *gigantiea* differs from *N. kamerunensis* (the only other species in the genus) in the structure of the copulatory glands. *Oncicola fraterna* n.sp. from *Panthera pardus* has very small eggs, the smaller sized hooks III, IV, V and VI and a ruff-like collar around the base of the rostrum. *Pholidostrongylus armatus* n.g., n.sp. from *Manis* (*Phatanginus*) *tricuspis* differs from all other members of the Trichostrongylinae in the structure of the copulatory bursa. *Manistrongylus manidis* n.g., n.sp. from *M.* (*P.*) *tricuspis* differs from other trichostrongyles with vulvar valves by the form of the copulatory bursa. *Capillaria corneti* n.sp. from *Scutisorex someri* is unique in the genus in the form of the copulatory bursa. There is an extensive bibliography. S. Willmott

1030—KRUSE, D. N., 1959. [Department of Biological Sciences, Florida State University, Tallahassee, Florida, U.S.A.] "Parasites of the commercial shrimps, *Penaeus aztecus* Ives, *P. duorarum* Burkenroad and *P. setiferus* (Linnaeus)." **Tulane Studies in Zoology. New Orleans, 7** (4), 123–144.

The following helminths were found on examination of 128 *Penaeus aztecus*, 137 *P. duorarum* and 36 *P. setiferus* from the north-west Gulf coast of Florida. *Opecoeloides fimbriatus* (Linton, 1934) metacercariae infected 100% of *P. duorarum*. The species is redescribed from the type specimens and the author's material. *Prochristianella penaei* n.sp. plerocerci were present in 93·6% of all shrimps. The new species differs from *P. trygonicola* and *P. tenuispinis* (the other two species in the genus) chiefly in the arrangement and structure of hooks of the metabasal armature of the tentacles. In *Penaeus duorarum* two new species of *Parachristianella* were found, *P. monomegacantha* n.sp. (two specimens) and *P. dimegacantha* n.sp. (one specimen). These are smaller than *P. trygonis* (the only other species in the genus), their bothridia approximate more closely anteriorly and the posterior margins are not as free, and the blastocysts are not sharply divided into an anterior and posterior region. Furthermore, *P. monomegacantha* has only two rows of large recurved hooks with long bases on the inner surface of the tentacle, and *P. dimegacantha* has fewer hooks in each ascending half-turn spiral row, a different arrangement of rows and the bulbs are less than a third of the holdfast length. The two species differ from each other in hook arrangement and the relative sizes of the bothridia, bulbs and postbulbosal regions. A small unidentified cestode larva is reported from 16·4% of *Penaeus aztecus* and 10% of *P. duorarum*. Juveniles of *Contracaecum* sp. infected all the shrimps to a small degree. The only other report of this nematode from shrimps was made by Margolis & Butler in 1954. G. I. Pozniak

1031—PRUDHOE, S., 1957. [British Museum (Natural History), London, England.] "Trematoda." **Exploration du Parc National de l'Upemba. Mission G. F. de Witte (1946-49). Brussels,** Fasc. 48, 28 pp.

In this collection of trematodes there are two new forms. *Neogyrodactylus congolensis* n.g., n.sp. from the skin of *Clarias lazera* is the first monogenetic trematode to be recorded from a fresh-water fish in Africa; it is related to *Gyrodactylus* and *Gyrodactyloides* but may be distinguished by the structure of the opisthaptor and the organization of the female genital system. *Clinostomum pyriforme* n.sp. from the mouth of *Aonyx capensis* differs from other members

of the genus by its small size and the position of the cirrus sac which lies on the anterior margin of the foremost testis. The metacercaria of *Thapariella* sp., obtained from the body surface beneath the shell of *Lanistes* sp. (probably *L. procera*), is described and discussed and Thapariellidae is considered synonymous with Brachylaemidae. Other species on which morphological and other data are given are: *Mesocoelium monodi*, *Nephrostomum ramosum*, *Clinostomoides brieni*, *Paramphistomum microbothrium*, *Cotylophoron cotylophorum*, *Carmyerius exoporus*, *C. mancupatus*, and *Gastrodiscus aegyptiacus*. S. Willmott

INVERTEBRATE INTERMEDIATE HOSTS

Arthropoda

1032—CHOW, C. Y., LIE KIAN JOE, WINOTO, R. M. P., RUSAD, M. & SOEGIARTO, 1959. [WHO Regional Office for the Western Pacific, Manila, Philippines.] "The vector of filariasis in Djakarta and its bionomics." **Bulletin of the World Health Organization, 20** (4), 667–676. [French summary pp. 675–676.]

Chow *et al.* investigated the transmission of *Wuchereria bancrofti* in two villages on the fringe of Djakarta City, where the infection rate in man was known to be 7·8%. Six species of mosquitoes were collected in houses, *Culex pipiens fatigans* being the predominant species and the only species infected with filariae. Routine dissections of 24,271 females of this species revealed that 1·8% were infected with filariae and 0·3% contained infective larvae. The average number of filariae (of all stages of development) per mosquito was 0·12 and the average number of infective larvae per mosquito was 0·014. Infected mosquitoes were collected throughout the year, the highest infection rate in mosquitoes occurring in September and the lowest in June. The type of breeding site, seasonal abundance, resting habits, time of entry into houses and feeding habits of *C. p. fatigans* are described and their susceptibility to insecticides is briefly reported. P. Williams

1033—DIJK, W. J. O. M. VAN, 1959. "The suitability of *A. koliensis* as an intermediate host for *Wuchereria bancrofti*." **Tropical and Geographical Medicine. Amsterdam, 11** (3), 259–262.

Van Dijk records the results of experiments in which wild-caught *Anopheles koliensis* were fed on patients infected with *Wuchereria bancrofti*. When 36 specimens were fed to a person with a low density of microfilariae in the peripheral blood, 19 (55%) contained filaria larvae and of the 16 mosquitoes that survived to the 11th day after the blood meal, nine (56%) contained filariae, three harbouring infective forms. Of 22 mosquitoes fed on a person with a higher density of microfilariae in the peripheral blood, 21 were found to contain developing filariae, four harbouring infective forms. Development of the larvae was regular, most filariae dissected from the same mosquito being at the same stage of development; infective larvae were recovered from mosquitoes between the 10th and 11th days after the blood meal. *A. koliensis* is the predominant species of mosquito in the Hollandia area of New Guinea where the experiments were carried out and it is concluded that this mosquito plays an important part in the transmission of *W. bancrofti* in inland areas of New Guinea. P. Williams

1034—DUKE, B. O. L., 1960. [Helminthiasis Research Unit of the West African Council for Medical Research, Kumba, Southern Cameroons, U.U.K.A.] "Studies on the biting habits of *Chrysops*. VII. The biting-cycles of nulliparous and parous *C. silacea* and *C. dimidiata* (Bombe form)." **Annals of Tropical Medicine and Parasitology, 54** (2), 147–155.

Using the presence of follicular relics on the ovarioles of parous flies as a means of distinguishing between nulliparous and parous *Chrysops silacea* and *C. dimidiata* (Bombe form), Duke shows that these components of the biting population caught in the presence of a wood fire at ground level in the rain-forest have different biting cycles. In the absence of a fire, the biting cycles of the two components of the *C. dimidiata* (Bombe form) population were not substantially different from those in the presence of a fire but the difference in the biting cycles of nulliparous and parous *C. silacea* was no longer evident. Only parous flies were infected with the larvae of *Loa loa* and, in the presence of a wood fire, parous flies of both species were more numerous in the afternoon than in the morning. P. Williams

1035—EVANS, B. R., PHILLIPS, W. G. & BICKLEY, W. E., 1959. [U.S. Public Health Service Quarantine Station, New Orleans (Algiers), Louisiana, U.S.A.] "Studies of 12 species of mosquitoes as potential vectors of filariae affecting skunks, squirrels and raccoons in Maryland." **Bulletin. Maryland Agricultural Experiment Station,** No. A-99, 31 pp.

Four filariae, *Dipetalonema procyonis* Price from raccoons, a *Dipetalonema* sp. from squirrels, and two *Dipetalonema* spp. from skunks did not attain the infective stage in 12 intermediate host species including five *Aedes* spp., three *Anopheles* spp., two *Culex* spp., *Mansonia perturbans* and *Psorophora ferox*. The filariae were ingested by all hosts, but became sluggish and immobile in the mid-gut by the second day, and had disappeared by the third or fourth day. The immobile nematodes showed brown bands of varying widths, due either to nematode degeneration or encapsulation. First-stage larvae in the thoracic muscle of *Anopheles punctipennis* were sometimes covered by brown pigment similar, but not identical, to that of the bands produced in the gut. Probably *A. punctipennis* would not serve as a developmental host after a single blood meal, although filariae from the squirrel developed to the first larval stage.

H. E. Welch

1036—LEWIS, D. J., 1960. [c/o British Museum (Natural History), London, England.] "Observations on *Simulium damnosum* in the Southern Cameroons and Liberia." **Annals of Tropical Medicine and Parasitology, 54** (2), 208–223.

Out of 1,292 *Simulium damnosum* from near Ikiliwindi in the Southern Cameroons, 316 were parous and of these 12·7% were infected with *Onchocerca volvulus* or similar nematodes. On the Lofa river in Liberia, 107 of the dissected 241 flies were parous and of these only 2·8% contained sausage larvae and 0·9% vermiform larvae. It was found that many microfilariae are trapped by the peritrophic membrane, but that many do not enter it. Observations were also made on the local differences between populations and in the size of flies, their biting habits and the ovarian changes in relation to age. A method for removing the blood-filled peritrophic membrane from flies, for keeping flies alive and other procedures are described.

G. I. Pozniak

1037—SYMES, C. B., 1960. "Observations on the epidemiology of filariasis in Fiji." **Journal of Tropical Medicine and Hygiene, 63** (1), 1–14.

Symes has investigated the distribution of the mosquitoes and their breeding sites in certain area of the Fiji Islands. *Culex fatigans* and *Aedes annulirostris* were commonest in houses while *A. pseudoscutellaris* and *A. polynesiensis* were commonest in the bush. On examination of wild animals, microfilariae were found in one out of thirteen *Steptopelia chinensis*, microfilariae of *Diplotriaena nocti* in 18 out of 112 mynah birds, and no microfilariae in four hawks, 21 pigeons, two collared lorys, four swamp hens, seven magpies and 14 domestic fowls. *Microfilaria fijiensis* or the microfilariae of *Chiropterofilaria brevicaudata* were found in 38 out of 111 *Pteropus hawaiiensis*, microfilariae of *Dirofilaria immitis* in 64 out of 86 dogs, microfilariae of *Setaria* sp. in three out of 106 cattle, and no microfilariae in 167 cave bats, 15 horses, 44 domestic pigs, 12 cats, 7 goats, 21 *Rattus rattus* and three mongooses. *Microfilaria fijiensis* developed in the laboratory in *A. pseudoscutellaris*, *A. polynesiensis* and *A. fijiensis*, and developing *D. immitis* were found in *A. pseudoscutellaris*, *A. fijiensis*, *C. fatigans*, *C. annulirostris*, *A. aegypti* and *A. vexans*. The differences between the third-stage larvae of *Wuchereria bancrofti*, *D. immitis* and *Microfilaria fijiensis* are described. Infection rates are given for *W. bancrofti* in some hundreds of *A. pseudoscutellaris*, *A. polynesiensis*, *C. fatigans*, *C. annulirostris*, *A. fijiensis* and *A. vexans* which were caught in the bush or in houses, and of some mosquitoes caught in houses occupied by infected people. Infection in mosquitoes appeared not be to confined to the immediate vicinity of the villages.

W. A. F. Webber

1038—SYMES, C. B., 1960. "Observations on the epidemiology of filariasis in Fiji. Part II." **Journal of Tropical Medicine and Hygiene, 63** (2), 31–44.

Aedes aegypti, *A. pseudoscutellaris*, *A. polynesiensis* and *Culex fatigans*, bred from eggs laid in the laboratory, and *C. annulirostris*, *A. vexans*, *C. sitiens* and *A. fijiensis* obtained from larvae collected in the field, were fed on carriers of microfilariae of *Wuchereria bancrofti* (Pacific form). In *A. vexans*, *C. annulirostris*, *C. sitiens* and *A. aegypti* the filariae died at or before the first larval stage; in *C. fatigans* third-stage larvae developed in 45% of the mosquitoes, but

dead or retarded larvae were common; in *A. fijiensis*, *A. polynesiensis* and *A. pseudoscutellaris* third-stage and mature larvae were found in about 80% of the mosquitoes. The density of infection of *A. pseudoscutellaris*, *A. fijiensis* and *C. fatigans* was proportional to the microfilaria rate in the donors upon whom they fed; some became infective after feeding on carriers with microfilaria counts as low as 0·04, 0·3 and 0·5 per 20 cu.mm. of blood. The intake of microfilariae was greater than would be expected from the size of the blood meal, possibly due to the excretion of serum during and after feeding; about half of the microfilariae were destroyed within 24 hours of feeding. Filariae at all stages of development were found in the legs of *A. pseudoscutellaris* and *A. fijiensis* but these were a very small proportion of the total number of larvae. The majority of third-stage infections in *A. pseudoscutellaris* were seen on the 13th to 14th days, in *A. fijiensis* on the 13th to 15th days, and in *C. fatigans* on the 15th to 16th days; the length of development was also influenced by seasonal climatic changes. A modification of Knott's method was used for estimating the numbers of microfilariae in blood; 8% to 16% of the infections detected by this method were missed when one to three 20 cu.mm. thick blood films were examined. There was thought to be a tendency for numbers of microfilariae in the peripheral blood to be greater in the afternoon and evening than at other times. Microfilaria rates of 1,976 people in Fijian villages on four islands are given, by age and sex; the highest rates were in people over 50 years of age and the highest microfilaraemias from 35 years onwards. The incidence of signs and symptoms of filariasis in 2,142 people from these villages is given; microfilariae were found in 389, of whom 98 had clinical signs; microfilariae were not found in 1,753, of whom 128 had clinical signs.

W. A. F. Webber

1039—WILLEMSE, J. J., 1959. "*Culex fatigans* from New Guinea and *Aëdes polynesiensis* from Samoa as intermediate hosts of *Wuchereria bancrofti* (periodic form)." **Tropical and Geographical Medicine. Amsterdam, 11** (3), 237–245.

Willemse reports experiments in which laboratory-reared strains of *Culex fatigans* (originally from Sorong in West New Guinea) and of *Aedes polynesiensis* (from Samoa) were fed on a patient who had acquired an infection of *Wuchereria bancrofti* in Surinam, South America. The mosquitoes were maintained in a constant temperature of 25°C. and in a relative humidity of 80%. 34% of the specimens of *C. fatigans* that were exposed to the infection were found, on dissection, to contain filaria larvae; infective stage larvae were found in mosquitoes dissected on the 16th day after the blood meal. The development of the filariae in *A. polynesiensis* was similar to that in *C. fatigans*, 23% of the mosquitoes in one series of experiments and 44% in another series being found to contain filaria larvae. The mosquitoes did not survive long enough for the filariae to develop to the infective larval stage but, because one early third-stage larva was dissected from a mosquito on the 11th day after the blood meal, the author concludes that complete development of the worms could, in more favourable conditions, occur in *A. polynesiensis*. The paper is illustrated with photomicrographs of different stages in the development of the worms.

P. Williams

Mollusca

1040—BARBOSA, F. S. & BARBOSA, I., 1959. [Instituto Nacional de Endemias Rurais, Centro de Pesquisas, Aggeu Magalhães, Recife, Brazil.] "Observations on the ability of the snail *Australorbis nigricans* to survive out of water in the laboratory." **Journal of Parasitology, 45** (6), 627–630.

Barbosa & Barbosa have carried out laboratory experiments to determine the ability of the snail *Australorbis nigricans* to survive out of water. Wild snails showed a poor survival rate compared to a strain of *A. glabratus* which was used as a control and only 2% were still alive after 60 days compared with 73% of the *A. glabratus*. Similar experiments with the F_4 generation of the same strains, showed that the survival rate in *A. nigricans* had deteriorated; in one strain none of the individuals tested survived six days of desiccation and in the other strain none survived nine days, while the control group showed a much better survival rate.

C. A. Wright

1041—BARBOSA, F. S. & BARRETO, A. C., 1960. [Instituto Nacional de Endemias Rurais, Centro de Pesquisas, Aggeu Magalhães, Recife, Pernambuco, Brazil.] "Differences in susceptibility of Brazilian strains of *Australorbis glabratus* to *Schistosoma mansoni*." **Experimental Parasitology, 9** (2), 137–140.

Barbosa & Barreto have tested the susceptibility of *Australorbis glabratus* from Salvador, Brazil and from Pernambuco, Brazil to infection with *Schistosoma mansoni* from Pernambuco. They found that the compatibility between the Salvador snails and the parasite was poor (only 1·7% becoming infected) compared to that of the Pernambuco snails. No morphological differences between the two strains of snail could be detected but there was a reduction in the fertility of the snails when the two strains were crossed. The authors suggest that this evidence shows that the differences in susceptibility are due only to the snails and not to the parasite. C. A. Wright

1042—BEDNARZ, S., 1960. [Muzeum Zoologiczne Instytutu Zoologicznego, Universytet Wrocławski, Wrocław, Sienkiewicza 21, Poland.] "On the biology and ecology of *Galba truncatula* Müll. and cercariae of *Fasciola hepatica* L. in basin of the river Barycz." **Acta Parasitologica Polonica, 8** (8/20), 279–288. [Polish summary p. 288.]

In the basin of the river Barycz in Lower Silesia, 109 permanent and temporary biotopes of *Galba truncatula* (varying from 1 sq.m. to 100 sq.m.) were found. The snails appeared between March and December, and their average infection with *Fasciola hepatica* was 15% while that of local cattle was 27·5%. *G. truncatula* favoured places near water and in the vicinity of habitation, but avoided acid soils. Other snails living with *G. truncatula* were not infected. G. I. Pozniak

1043—CHERNIN, E. & SCHORK, A. R., 1960. [Department of Tropical Public Health, Harvard School of Public Health, Boston, Massachusetts, U.S.A.] "Effects of streptomycin on the hatching of *Australorbis glabratus* eggs." **Experimental Parasitology, 9** (1), 9–13.

Chernin & Schork report the result of experiments to study the effect of streptomycin on the hatching of the eggs of the snail *Australorbis glabratus*. The antibiotic was tested in a variety of solutions containing different ions and it was found that in most cases streptomycin had a marked inhibitory effect on the hatching of the eggs. This inhibition is blocked by the presence of calcium ions but not manganese. C. A. Wright

1044—HASHIMOTO, I., 1959. [Department of Parasitology, National Institute of Health, Tokyo, Japan.] [The relation between the growth of germ cell and the shell length of *Oncomelania nosophora*.] **Japanese Journal of Parasitology, 8** (6), 951–957. [In Japanese: English summary pp. 954, 957.]

The correlation between the occurrence of germ cells in the genital organs and the shell length of *Oncomelania nosophora* was studied. In snails 3·0 mm. long spermatogonia and spermatocytes, in some of which maturation division had already started, were recognized, but there were no spermatozoa among them. In snails measuring 3·5 mm. in length, a few spermatozoa 90 μ to 100 μ long were observed together with stages in maturation divisions and spindle-shaped spermatocytes. Snails longer than 5·0 mm. had numerous spermatozoa. The occurrence of spermatozoa in the seminal vesicle was noticed in a few snails 5·5 mm. long and was always observed in snails of 7·5 mm. or longer. In snails measuring 3·0 mm. to 3·5 mm. in shell length, the youngest oocytes in an early stage of growth were observed on the inner wall of the ovary. In the snails 4·0 mm. long, three kinds of oocytes were observed in the ovary; the youngest ones staining heavily with haematoxylin, the growing ones staining less intensely, and the fully grown ones containing eosinophilic granules in the cytoplasm. Oocytes or egg cells were never found in the oviduct of snails smaller than 5·5 mm. in shell length but were always present in snails measuring more than 7·5 mm. Y. Yamao

1045—HASHIMOTO, I., 1960. [Department of Parasitology, National Institute of Health, Tokyo, Japan.] [The relation between copulation and shell character of *Oncomelania nosophora*.] **Japanese Journal of Parasitology, 9** (1), 42–48. [In Japanese: English summary p. 48.]

Copulation of *Oncomelania nosophora* was observed in individuals with shells 5·6 mm. long and upwards, the highest rate being observed in males with shells 6·6 to 7·0 mm. in length, and in females with shells 7·1 to 7·5 mm. Copulation occurred only in snails of either sex in which the appearance of the outer lip of the genital aperture showed sexual maturity to have been obtained. Y. Yamao

1046—KOMIYA, Y., HASHIMOTO, I. & KOYAMA, T., 1959. [Department of Parasitiology, National Institute of Health, Tokyo, Japan.] [The survival of *Oncomelania nosophora* in the newly constructed concrete aquarium.] **Japanese Journal of Parasitology, 8** (6), 943–950. [In Japanese: English summary p. 950.]

As a result of experiments, Komiya *et al.* concluded that the water in a newly constructed concrete aquarium was toxic to *Oncomelania nosophora*, owing to the discharge of lime from the fresh concrete. Y. Yamao

1047—NAJARIAN, H. H., 1960. [University of Texas Medical Branch, Galveston, Texas, U.S.A.] "Maintenance and rearing of the snail *Bulinus truncatus* in the laboratory." **Journal of Parasitology, 46** (2), 153.

Najarian reports that *Bulinus truncatus*, the intermediate host of *Schistosoma haematobium* in Iraq, can be maintained in non-aerated Baghdad tap water without vegetation, mud or sand. The aquaria were maintained at temperatures varying between 15·5°C. to 25·5°C., the water was changed daily and the snails were fed on either boiled lettuce or spinach. Incubation of eggs required from 8 to 19 days at these maintenance temperatures. C. A. Wright

1048—NISHIMOTO, M., 1958. [Department of Pathology, Tokushima University School of Medicine, Tokushima, Japan.] [Studies on the first intermediate host of *Clonorchis sinensis* in Tokushima Prefecture.] **Shikoku Acta Medica, 12** (4), 580–595. [In Japanese: English summary p. 580.]

An investigation of *Parafossarulus manchouricus japonicus*, the first intermediate host of *Clonorchis sinensis*, was made from December 1955 to November 1957 in Tokushima Prefecture, Shikoku. Out of 10,400 snails, 118 (1·14%) were found positive for larvae of *C. sinensis*. According to a monthly examination in Naruto City the larvae of *C. sinensis* were found at a high rate in May (4·15%) and October (2·49%). Cercariae of *Echinochasmus japonicus*, *E. perfoliatus*, *Cercaria mucobuccalis*, *Cyathocotyle orientalis*, *Asymphylodora tincae*, *Notocotylus attenuatus* and unidentified species belonging to the Echinostomatidae, and metacercariae of *A. tincae*, *N. attenuatus* and Kurokawa's 3rd metacercariae (1935) were also found in the snails. Y. Yamao

1049—REY, L., 1959. [Instituto de Medicina Tropical, São Paulo, Brazil.] "Molluscs of the genus *Oncomelania*, in Brazil, and their possible epidemiological significance." **Revista do Instituto de Medicina Tropical de São Paulo, 1** (2), 144–149. [Portuguese summary p. 149.]

A new species, *Oncomelania brasiliense*, is described from the State of Mato Grosso in Brazil; the molluscs populated brooks with plenty of vegetation, irrigation ditches and plantations of water-cress. The species is very similar to *O. nosophora* which transmits schistosomiasis japonica in Asia, but differs from it in the absence of a varix on the outer lip. Schistosomiasis japonica has not at present been detected among the population of this region (mostly Japanese agricultural settlers) but since Asiatic immigration from endemic areas still continues a real danger exists should this hydrobid snail prove a potential host. G. I. Pozniak

1050—SHIFF, C. J., 1960. [Malaria and Bilharzia Research Laboratory, Salisbury, Southern Rhodesia.] "Observations on the capability of freshwater vector snails to survive dry conditions." **Journal of Tropical Medicine and Hygiene, 63** (4), 89–92.

Shiff has investigated the ability of snail intermediate hosts of schistosomes and Fasciola in Southern Rhodesia to survive out of water. Experiments were carried out on *Biomphalaria pfeifferi*, *Bulinus globosus* and *Lymnaea natalensis*, both in conditions of constant humidity and on damp mud in boxes out of doors. The results indicate that both *B. pfeifferi* and *B. globosus* have considerable powers of survival as adults but not *L. natalensis*. The lymnaeid, however, was able to lay eggs on damp mud and when these hatched the young snails made their way into cracks in the mud in which they continued to survive. C. A. Wright

1051—WEBBE, G., 1960. [Ministry of Health, Tanganyika Territory.] "Observations on the seasonal fluctuation of snail-population densities in the Northern Province of Tanganyika." **Annals of Tropical Medicine and Parasitology, 54** (1), 54–59.

Webbe reports the results of 18 months observations on the fluctuations in population density of *Biomphalaria pfeifferi nairobiensis*, an intermediate host of *Schistosoma mansoni*, in Northern

Tanganyika. The numbers of snails were estimated from the results of hand-collecting and the use of bamboo raft traps. The results indicate that there is a marked drop in population density after the long rains but that the short rain season has no apparent effect. C. A. Wright

1052—WRIGHT, C. A., 1959. [British Museum (Natural History), London S.W.7, England.] "A note on the distribution of *Bulinus senegalensis*." **West African Medical Journal, 8** (4), 142–148.
Wright briefly reviews the records of the distribution of *Bulinus senegalensis* (an intermediate host for *Schistosoma haematobium* in West Africa) and discusses the zoogeographical treatment of the fresh-water Mollusca of Africa. The ecology of *B. senegalensis* is discussed and the probable range of the species and its epidemiological significance is mentioned. C. A. Wright

1053—YOSHIDA, Y. & MIYAMOTO, M., 1960. [Department of Medical Zoology, Kyoto Prefectural University of Medicine, Kyoto, Japan.] [Another new first intermediate host, *Assiminea yoshidayukioi* Kuroda, 1959, of *Paragonimus ohirai* Miyazaki, 1939.] **Japanese Journal of Parasitology, 9** (2), 211–216. [In Japanese: English summary p. 216.]
From laboratory and field observations, Yoshida & Miyamoto found *Assiminea yoshidayukioi* Kuroda, 1959, to be a new first intermediate host of *Paragonimus ohirai*. Y. Yamao

Control

1054—BLANC, M. & D'AUBENTON, F., 1957. "Sur une seconde mission relative à la lutte contre l'onchocercose en A.O.F." **Bulletin du Muséum National d'Histoire Naturelle. Paris,** 2e Série, **29** (3), 256–259.
D.D.T. applied in doses of 1·5 mg. to 3 mg. per litre of water for 30 minutes was very efficient against simuliid larvae. The drug did not cause any damage to fishes except when it was applied as a suspension in paraffin oil which accumulated at the beginning of the calm zones of the river. N. Jones

1055—OKABE, K., NAKAO, S., SHIMOMURA, M. & TANAKA, T., 1959. [Department of Parasitology, Kurume University School of Medicine, Kurume, Japan.] [Burying experiments of *Oncomelania nosophora* and its distribution in the soil in winter.] **Journal of the Kurume Medical Association, 22** (10), 3752–3756. [In Japanese: English summary p. 3756.]
Oncomelania snails, the first intermediate host of *Schistosoma japonicum*, were kept in the soil at different depths in winter. Under wet conditions, eight snails came to the surface in the following spring, but none did so under dry conditions. After six months all the snails were examined for survival. In dry conditions the deeper the snails were buried the more of them survived. All snails in wet conditions were dead. From the results obtained, the authors conclude that it is necessary to bury *Oncomelania* snails at least 6 cm. deep in the soil. Okabe *et al.* also found that only seven *Oncomelania* snails out of 335 gathered from the bed of the Chikugo river in February and March of 1957 were found 1 cm. or more deep in the mud. Y. Yamao

1056—OMORI, N. ET AL., 1959. [Department of Medical Zoology, Research Institute of Endemics, Nagasaki University, Nagasaki, Japan.] [Filaria control experiments in western Kyushu, Japan.] **Japanese Journal of Parasitology, 8** (6), 886–894. [In Japanese: English summary pp. 893–894.]
Experiments to control filariae by eradicating the vector mosquitoes and treating the microfilarial carriers were started from mid-July 1958 on three islets, Yaburoki, Oshima and Noshima, in Nagasaki Prefecture. The predominant and most important mosquitoes found were *Culex pipiens pallens* and *Aedes togoi*. For adult mosquitoes, residual spraying of D.D.T. or dieldrin was carried out in all houses. In the breeding places of larvae, such as cesspools, fertilizer pits and rock or tide pools, 1% D.D.T. emulsion was sprayed except in Noshima, where the application of larvicide was neglected. Soon after the treatment in Yaburoki and Oshima, very few mosquitoes were seen around the houses, which continued mosquito-free until the end of September. The percentages of carriers of microfilariae among the residents of these islets were: in Noshima 5·26%, in Oshima 6·9% and in Yaburoki 20·6%. Administration of supatonin at 2·0 mg. per kg. once a week for ten consecutive weeks would be most effective. Y. Yamao

1057—SALITERNIK, Z. & WITENBERG, G., 1959. [Antimalaria Division, Ministry of Health, Jerusalem, Israel.] "Investigations on the control of bilharziasis vectors in Israel." **Bulletin of the World Health Organization, 21** (2), 161–177. [French summary pp. 175–177.]
Saliternik & Witenberg present a summary of their investigations on bilharziasis in Israel. They discuss the epidemiology of the disease and describe both laboratory and field experiments on the eradication of the snail intermediate hosts. The factors influencing the repopulation of habitats by *Bulinus* snails are mentioned and suggestions for the prevention of the disease in Israel are made. These include supervision of all bodies of water with which there is much human contact, control of aquatic plants, limited use of molluscicides, proper sewage disposal and water management, and adequate health education in schools. C. A. Wright

1058—SYMES, C. B., 1960. "Observations on the epidemiology of filariasis in Fiji. Part III." **Journal of Tropical Medicine and Hygiene, 63** (3), 59–67.
Two day-biting bush mosquitoes, *Aedes pseudoscutellaris* and *A. polynesiensis*, and two house-frequenting mosquitoes, *A. fijiensis* and *Culex fatigans*, appear to be concerned in the transmission of *Wuchereria bancrofti* (Pacific form) in the Fiji Islands; it is difficult to assess their relative importance. Preliminary experiments on removing breeding facilities and spraying houses with insecticides are reported. Of about 30 microfilaria carriers who were treated with various dosage schedules of diethylcarbamazine, more than half remained microfilaria-positive at the end of treatment. W. A. F. Webber

GENERAL HELMINTHOLOGY

Technique

1059—AMATO NETO, V., CORRÊA, M. O. A. & CORRÊA FLEURY, G., 1957. [Seção de Parasitologia do Instituto Adolfo Lutz (Laboratório Central de Saúde Pública).] "Estudo sôbre o valor do método de Rugai, Mattos e Brisola na pesquisa de larvas de nematóides nas fezes." **Revista do Instituto Adolfo Lutz. São Paulo, 17,** 33–38. [English summary p. 37.]
Amato Neto *et al.* examined 170 faecal samples for larvae, while assessing the results of treatment against *Strongyloides stercoralis* infection. Two methods were used, namely, Baermann's technique as applied by Coutinho *et al.* in 1951 [see **Rev. clin. S. Paulo, 27,** 1–10], and the method of Rugai *et al.* [for this modified Baermann's technique see Helm. Abs. **23,** No. 715a]. 112 samples were positive and 47 negative with both methods, whereas eight were positive with Baermann's method only and three with that of Rugai *et al.* only. In these last 11 samples the number of larvae was very small. N. Jones

1060—CHU, G. W. T. C. & RYAN, E. P., 1960. [Department of Zoology, University of Hawaii, Honolulu, Hawaii.] "A technique for maintenance of the snail *Littorina pintado* in the laboratory." **Journal of Parasitology, 46** (2), 249.
Chu & Ryan describe a method for the maintenance of *Littorina pintado*, intermediate host of *Austrobilharzia variglandis* in the laboratory. Wide mouth jars or 1 litre Erlenmeyer flasks were used, the bottoms were coated with a thin layer of the snail food described by Lee & Lewert and allowed to dry overnight before snails and sea water were added. The jars were inverted over 8 in. finger bowls to which sea water was added to equalize the level inside the jar and the flasks were provided with stoppers with a U-shaped glass tube and were then inverted so that water could not enter the tube. In the jars the water had to be changed about twice a week but only once a week in the flasks. Uninfected snails were kept by these methods for nine months with only about 20% mortality but infected individuals did not survive for more than one to two months. C. A. Wright

1061—D'HERDE, J. & BRANDE, J. VAN DEN, 1959. "Een nieuwe machine voor bodemfumigatie—proefuitslagen ter illustratie." **Mededelingen van de Landbouwhogeschool en de Opzoekingsstations van de Staat te Gent, 24** (3/4), 637–644. [English, French & German summaries p. 943.]
The authors describe two wheeled prototypes of a field applicator which allows correct distribution of very low doses of soil fumigants. Changes in flow due to forward speed variations are eliminated. J. E. Peachey

1062—DOUGHERTY, E. C., HANSEN, E. L., NICHOLAS, W. L., MOLLETT, J. A. & YARWOOD, E. A., 1959. "Axenic cultivation of *Caenorhabditis briggsae* (Nematoda: Rhabditidae) with unsupplemented and supplemented chemically defined media." **Annals of the New York Academy of Sciences, 77** (2), 176–217.

Details are given of methods for axenic culture of *Caenorhabditis briggsae*. The composition of media are described with results on the culture of the nematode. The best growth obtained with *C. briggsae* is less than that in the presence of bacteria. The B-vitamins folic acid, niacinamide, pantothenic acid, pyridoxine, riboflavin and thiamine are necessary for growth of the cultures. Ten amino-acids, essential to rats, have also been shown to be essential to the nematode. Improvement of nutritional balance with respect to amino-acid levels and to relative levels of amino-acids in relation to vitamins or salts is also discussed. H. R. Wallace

1063—FERRIOLLI, Jr., F., 1959. [Faculdade de Medicina Ribeirão Prêto, São Paulo, Brazil.] "Diagnóstico da estrongiloidíase. Modificações do método de Baermann-Morais." **Revista do Instituto de Medicina Tropical de São Paulo, 1** (2), 138–140. [English summary p. 140.]

1064—HAYASHI, S., 1959. [Department of Parasitology, Institute of Infectious Diseases, University of Tokyo, Tokyo, Japan.] [Evaluation of the effects of diethylcarbamazine-treatments and anti-mosquito measures in the filariasis control studies based on the efficiency of the thick blood smear examinations.] **Japanese Journal of Parasitology, 8** (6), 904–908. [In Japanese: English summary p. 908.]

During the years 1950–58, nine surveys were conducted on Hachijo-Koshima Island for malayan filariasis. The examination of microfilariae was made using the three drop method making three thick blood smears per person at night. The efficacy for detecting microfilariae in a single drop was estimated as 0·5646; the efficacy of the three drops was computed as 0·9175. Y. Yamao

1065—HOSAKA, Y., 1959. [Department of Parasitology, National Institute of Health, Tokyo, Japan.] [Study of standardized techniques for testing the susceptibility of *Oncomelania* snails to molluscicides.] **Japanese Journal of Parasitology, 8** (6), 935–942. [In Japanese: English summary p. 942.]

Various experiments were carried out to show the best method of determining the effectiveness of molluscicides against *Oncomelania*. The most effective routine was found to be as follows: snails of the same shell length, collected in the same district on the same day, and the direct immersion method II should be used; the period of exposure should be 48 hours; the temperature should be kept at about 25°C. Y. Yamao

1066—HUNTER, III, G. W., 1960. [Department of Microbiology, College of Medicine, University of Florida, Gainesville, Florida, U.S.A.] "The use of anticoagulants and chlorobutanol for the recovery of adult schistosomes from mice." **Journal of Parasitology, 46** (2), 206.

Hunter reported that the use of the anaesthetic chlorobutanol greatly improved the Perf-O-Suction technique of Radke *et al.* (1957) [for abstract see Helm. Abs., **26,** No. 398bo] for the recovery of schistosomes from hamsters. Intraperitoneal injection of 7·5 mg. in 0·5 ml. distilled water resulted in considerable relaxation of the parasite allowing easy removal by the above technique. In a series of 46 perfusions only one parasite was found after careful dissection of the perfused organs. D. L. H. Robinson

1067—ISAAC, P. K., 1960. [Department of Botany, University of Manitoba, Winnipeg, Manitoba, Canada.] "A whole-mount technique for studying infected leaves." **Phytopathology, 50** (6), 474–475.

Isaac describes a permanent whole-mount technique in which leaf portions, about 5 mm. square, are dropped into a 95: 5 fixative mixture of dioxan and propionic acid in a flask which is corked and kept at 60°C. until the leaves are colourless. Specimens are then removed and washed in distilled water for at least three hours. They are mounted on a slide in Haem-gum staining mountant. Clearing is usually complete within a few days and differentiation between host and parasite is by stain intensity. This method may be used for observing nematodes, fungal pathogens and bacteria in leaves and seedlings. D. J. Hooper

1068—KOMIYA, Y. ET AL., 1960. [Department of Parasitology, National Institute of Health, Tokyo, Japan.] [Study on thick smear technique with cerophan cover for stool examination for helminth ova.] **Japanese Journal of Parasitology, 9** (1), 61–68. [In Japanese: English summary p. 66.]
The principle of this technique was to use a cerophan cover instead of an ordinary coverglass for faecal examination for helminth eggs. An advantage of this technique was the larger amount of faeces which could be examined at a time. Helminth eggs were more readily detected than in the routine direct smear technique using the coverglass. Y. Yamao

1069—KROTOV, A. I., 1958. [Maintaining and cultivating parasitic worms in artificial conditions.] **Uspekhi Sovremennoi Biologii, 46** (2), 230–239. [In Russian.]

1070—MARTÍNEZ BÁEZ, M. & MOLINA PASQUEL, C., 1960. [Instituto de Salubridad y Enfermedades Tropicales, México, D.F.] "Los supositorios de diacetoxidifenilpiridilmetano, un recurso auxiliar en la práctica de los exámenes coproparasitoscópicos." **Medicina. Revista Mexicana, 40** (842), 179–181.
Martínez Báez & Molina Pasquel report that the use of diacetoxydiphenylpyridyl-methane suppositories allowed them to obtain faecal samples from patients for examination within some minutes. The literature is reviewed and it is concluded that no side effects have been observed due to the use of this drug, even when administered orally. N. Jones

1071—NICHOLAS, W. L., DOUGHERTY, E. C. & HANSEN, E. L., 1959. "Axenic cultivation of *Caenorhabditis briggsae* (Nematoda: Rhabditidae) with chemically undefined supplements; comparative studies with related nematodes." **Annals of the New York Academy of Sciences, 77** (2), 218–236.
Attempts to replace complex materials such as liver protein fraction with chemically defined media have failed to produce good cultures. Nicholas *et al.* suggest that the undefined tissue extracts contain nutrients that are either not present or that improve the nutritional balance of the variety of chemically defined media tested. The hypotheses that waste products of the nematodes may inhibit growth unless inactivated by something present in the supplement and that the supplement may be necessary to make some of the constituents of the basal medium nutritionally available are also discussed. H. R. Wallace

1072—OBA, N., 1959. [Department of Parasitology, Kurume University School of Medicine, Kurume, Japan.] [Studies on *Gnathostoma spinigerum*. 3. Studies on the survival of *Gnathostoma spinigerum* in vitro.] **Journal of the Kurume Medical Association, 22** (8), 3012–3025. [In Japanese: English summary p. 3025.]
In Ringer's solution with slices of cat liver, third-stage larvae of *Gnathostoma spinigerum* from *Ophicephalus argus* survived for 69 days at 38°C. During this period, development and growth were observed. Chick-embryo juice was also found to contain substances promoting the survival of the worm. Y. Yamao

1073—OOSTENBRINK, M., 1959. [Plantenziektenkundige Dienst, Wageningen, Netherlands.] "Enkele eenvoudige proefveldschema's bij het saltjesonderzoek." **Mededelingen Landbouwhogeschool en de Opzoekingsstations van de Staat te Gent, 24** (3/4), 615–618. [English summary p. 618.]
Three simple experimental designs are described for studying the effects of nematicides, for comparing the susceptibility to damage of a series of plant species or varieties and for studying the effects of crop rotations on nematode populations. H. R. Wallace

1074—RINKOV, A., VAN GUNDY, S. D., RACKHAM, R. L. & GARBER, M. J., 1960. [Dept. of Plant Nematology, University of California, Citrus Experiment Station, Riverside, California, U.S.A.] "The use of the onion test as a quantitative method for determining the distribution of emulsifiable DBCP in soil." **Plant Disease Reporter, 44** (7), 510–515.
The authors describe the use of onion seedling growth as an index of the presence of dibromochloropropane in a test soil. Percentage reduction in growth was shown to be proportional to p.p.m. by volume of emulsifiable DBCP in the sample. Of the various treated soils tested in this way, those with high clay content were shown to reduce the dispersion of the fumigant. The picture obtained by using the onion test was related to the degree of nematode control achieved in various soils, but the former was a more acceptable way of studying dispersion.
J. E. Peachey

1075—SIDOROV, E. G., 1960. [Institut zoologii, Akademiya nauk Kazakhskoi SSR.] [The diagnosis of *Opisthorchis felineus* metacercarial infections in fish.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (2), 177–179. [In Russian.]

Sidorov examined seven specimens of fish for *Opisthorchis felineus* metacercariae by the following method: after skinning the body was divided by one horizontal and two vertical incisions into six regions (numbered longitudinally). Layers 2 mm. to 3 mm. thick were then sliced off and examined by compression. 80% to 95% of the metacercariae were found in the subcutaneous layer and most of the larvae were found in the middle region of the body. The exactness of this method was verified by examining a great number of fishes in the Pavlodar Region. *Bucephalus polymorphus* metacercariae were most frequent in the caudal muscles, especially in the deep layers. The author describes the characteristics by which the metacercariae of *O. felineus* can be distinguished from those of *B. polymorphus*. N. Jones

1076—STREU, H. T., 1960. "Observation of plant-parasitic nematodes on the roots of living plants using a glass-sided root observation box." [Abstract of paper presented at the 17th Annual Meeting of the Potomac Division, American Phytopathological Society, Beltsville, Md, February 25–26, 1960.] **Phytopathology, 50** (8), 573.

1077—TARJAN, A. C., 1960. "Predacious activity and growth of nematophagous fungi on various organic substances." [Abstract of paper presented at the 1960 Annual Meeting of the Southern Division, American Phytopathological Society, Beltsville, Md, February 25–26, 1960.] **Phytopathology, 50** (8), 577.

1078—UOTANI, K., 1960. [Department of Parasitology, Institute for Infectious Diseases, University of Tokyo, Japan.] [Studies on *Rhabditis* sp. isolated from human urine. 1. Comparative studies on culture methods.] **Japanese Journal of Parasitology, 9** (3), 322–327. [In Japanese: English summary p. 327.]

Rhabditis sp. (Ogu-*Rhabditis*) isolated from human urine by Hayashi *et al.* (1958) was maintained, in the laboratory, for more than one hundred generations in water with a small amount of dried yeast. In other solutions tested, i.e. Ringer's, Locke's or Tyrode's solutions, the nematode could survive only for a few days with no development. The optimum temperature for culturing was around 25°C.; the optimum *p*H ranged from 5·8 to 7·0. Y. Yamao

1079—WAGNER, A., 1960. [Department of Tropical Public Health, Harvard School of Public Health, Boston, Massachusetts, U.S.A.] "Maintenance of a marine snail in the laboratory." **Journal of Parasitology, 46** (2), 186.

Wagner describes the method of maintaining *Batillaria minima*, a marine snail and intermediate host of *Ornithobilharzia canaliculata* in the laboratory. The snails were kept in enamel pans of sea water (which was changed once a month) and aerated through stone bubblers. Twice each week the snails were removed from the aquaria and placed in 4 in. finger bowls of aerated sea water and provided with food consisting of bits of frozen shrimp, baker's yeast, scrapings of blackboard chalk, "Vita-Min" bricks and a prepared snail food. The snails were left with the food for four to eight hours and then replaced in the aquaria. After a year none of the uninfected snails had died and only one of those which were infected had died naturally, three had been killed and of the eight remaining individuals three had ceased to shed cercariae. C. A. Wright

1080—WHARTON, R. H., 1959. [Institute for Medical Research, Kuala Lumpur, Federation of Malaya.] "A simple method of mounting and preserving filarial larvae." **Bulletin of the World Health Organization, 20** (4), 729–730.

A medium containing 10 parts formaldehyde solution, 5 parts glycerol and 85 parts distilled water, with 0·0003 parts methylene blue added, can be used for preparing semi-permanent mounts of filarial larvae dissected from freshly killed mosquitoes. For later dissection the same medium without methylene blue can be used. When dissected in the formol-glycerin-methylene blue medium the larvae take up the stain more rapidly than mosquito tissues so facilitating their recovery. It is suggested that mosquitoes should be killed in saline to which Bles fluid (70% alcohol 90 parts, formaldehyde solution 7 parts, glacial acetic acid 3 parts) has been added. J. E. D. Keeling

1081—YAJIMA, F., 1960. [Department of Public Health, School of Medicine, Chiba University, Chiba, Japan.] [Studies on hookworm carriers in view of public health. 3. Relationship between recovery rate of hookworm ova by flotation and direct smear technique of faecal examination.] **Japanese Journal of Parasitology, 9** (2), 150–161. [In Japanese: English summary p. 161.]

Geographical Distribution

1082—CORDERO DEL CAMPILLO, M., SIMÓN VICENTE, F. & FERNÁNDEZ GONZÁLEZ, M., 1960. [Estacion Pecuaria Regional de Leon, Spain.] "Hallazgo de *Marshallagia marshalli* (Ransom, 1907) Orlov, 1933, en ovejas de León y Valladolid, y cabras de Salamanca." **Revista Ibérica de Parasitología, 20** (2), 221–228. [English summary p. 227.]

The occurrence of *Marshallagia marshalli* is reported for the first time from Spain where it is found in both sheep and goats. Morphological characters are given and there is a brief review of the literature concerning this species. H. D. Crofton

1083—EUROPEAN & MEDITERRANEAN PLANT PROTECTION ORGANIZATION, 1958. [142, Avenue des Champs-Élysées, Paris, France.] "Potato root eelworm in Europe and the Mediterranean Basin in 1957." **Paris: European and Mediterranean Plant Protection Organization,** 11 pp. [Also in French.]

This report discusses the incidence of potato-root eelworm in Europe and the Mediterranean Basin recorded in 1957, including information on the spread or regression of the pest in areas known to be infested, and on new pockets. These latter were recorded from Belgium, Iceland, Jersey, Netherlands, Portugal and Spain. There are also reports on the intensity of attacks and the level of infestation at which symptoms of damage were recorded for 19 countries. A. M. Shepherd

1084—EUROPEAN & MEDITERRANEAN PLANT PROTECTION ORGANIZATION, 1959. [142, Avenue des Champs-Élysées, Paris, France.] "Potato root eelworm in Europe and the Mediterranean Basin in 1958." **Paris: European and Mediterranean Plant Protection Organization,** 12 pp. [Also in French.]

This report discusses the incidence of potato-root eelworm in Europe and the Mediterranean Basin recorded in 1958. Information on the spread or regression of the pest in areas known to be infested and on new pockets is given, together with comments on the intensity of infestation and measures for prevention and control in the various countries. The pest is recorded for the first time in Switzerland, where nine pockets of infestation were found, the attacks being of light to medium intensity. No symptoms were observed in the crops, however. A. M. Shepherd

1085—EUROPEAN & MEDITERRANEAN PLANT PROTECTION ORGANIZATION, 1960. [142, Avenue des Champs-Élysées, Paris, France.] "Potato root eelworm in Europe and the Mediterranean Basin in 1959." **Paris: European and Mediterranean Plant Protection Organization,** 10 pp. [Also in French.]

This report discusses the incidence of potato-root eelworm in Europe and the Mediterranean Basin recorded in 1959. Very few new pockets are reported and the intensity of infestation was generally equal to or lower than that in previous years. No further infestations were recorded in Switzerland following the first discovery of the pest there in 1958. A. M. Shepherd

1086—GÜRALP, N., 1960. "Present situation of schistosomiasis in Turkey." **Acta Tropica. Basle, 17** (3), 261–263.

Examination of faeces and rectal scrapings and macroscopic examinations of mesenteric and portal veins of 268 sheep, 181 goats and 75 cattle in abattoirs of south-eastern Turkey, showed no schistosomiasis. Examination of faecal and urine samples of 19 persons revealed the presence of *Schistosoma haematobium* eggs in five urine sediments. No *Schistosoma* larvae were found in *Theodoxus mesopotamica*, *Hydrobia gaillardoti* or *Melanopsis mingrelica*. N. Jones

1087—HUTTON, R. F. & SOGANDARES-BERNAL, F., 1960. [Florida State Board of Conservation Marine Laboratory, Maritime Base, Bayboro Harbor, St. Petersburg, Florida, U.S.A.] "A list of parasites from marine and coastal animals of Florida." **Transactions of the American Microscopical Society, 79** (3), 287–292.

In addition to Annelida and Arthropoda, a check-list of Platyhelminthes including Cestoda and Trematoda, together with hosts and localities, is given from marine and coastal fishes and birds of Florida. W. M. Fitzsimmons

1088—KELLY, W. R., SLEITH, F. St. G. & HATCH, C., 1960. [Faculty of Veterinary Medicine, University College, Dublin, Republic of Ireland.] "*Dicrocoelium dendriticum* in a bovine animal in Ireland." [Correspondence.] **Veterinary Record, 72** (34), 696.

In a letter to the editor of The Veterinary Record the writers record the finding of *Dicrocoelium dendriticum* in an 18-month-old heifer reared on a farm in County Meath, Ireland. It is claimed that this is a new distribution record for the trematode which in the British Isles has only, thus far, been recorded from the Hebrides. W. M. Fitzsimmons

1089—POZO-LORA, R., 1960. [Facultad de Veterinaria de Córdoba, Spain.] "Aportaciones al inventario y ecología de los helmintos españoles. Especies encontradas en Córdoba." **Revista Ibérica de Parasitología, 20** (3), 403–410. [English summary p. 409.]

Pozo-Lora gives the results of an eleven-year helminthological investigation in Córdoba. The paper mentions 5 trematode, 21 cestode, 21 nematode and 2 acanthocephalan species. Some of these have already been included in previous accounts. The following new hosts have been recorded in Spain: *Bos taurus* for *Moniezia trigonophora*, *Ovis aries* for *M. benedeni* and *Oryctolagus cuniculus* for the larval stage of *Multiceps serialis*. N. Jones

1090—SERAFIŃSKA, J., 1958. "Materiały do fauny pijawek (Hirudinea) Polski." **Fragmenta Faunistica. Instytut Zoologiczny, Polska Akademia Nauk, 8** (3), 17–64. [English & Russian summaries pp. 62–64.]

Serafińska has studied the leech fauna of ten types of waters in Wielopolska and, for comparison, from near Zielona Góra, in Poland. She examined 6,587 specimens and records 15 species, noting their distribution in relation to the ecology of the habitat. G. I. Pozniak

1091—SMYTHIES, B. E., 1960. "Leeches of Borneo." **Sarawak Museum Journal. New Series,** Year 1959, **9** (13/14), 279–294.

Smythies reviews, in summary, records of leeches from Borneo. He lists and annotates *Mimobdella buttikoferi*, *Gastromobdella monticola*, *Hirudinaria javanica*, *H. manillensis*, *Haemadipsa zeylanica*, *H. sylvestris* and *H. picta*. L. R. Richardson

Cytology and Genetics

1092—GRESSON, R. A. R., 1957. [Department of Zoology, Queen's University of Belfast, Northern Ireland, U.K.] "Spermateleosis in *Fasciola hepatica*." **Quarterly Journal of Microscopical Science, 98** (4), 493–498.

The stages of spermateleosis in *Fasciola hepatica* were studied on live tissue under phase contrast microscopy and on smears fixed in Bouin's picro-formol and in Flemming without acetic, and also by the Feulgen technique. The nucleus of the late spermatid undergoes elongation and grows out from the distal end of the cell. The flagellum arises from an extension of cytoplasm and appears to be made up of an axial filament surrounded for its greater or entire length by a thin sheath of cytoplasm. The spermatozoon becomes free of the greater part of the cytoplasm of the spermatid and consists of a nucleus and a flagellum. The head is elongate and uniform in diameter except anteriorly, and a middle piece, comparable to that of a typical flagellate sperm, is absent. G. I. Pozniak

Morphology, Anatomy and Histology

1093—ANDERSON, M. G., 1960. [Department of Biology, New Mexico State University, University Park, New Mexico, U.S.A.] "An anomaly in a proglottid of *Taenia pisiformis* Bloch, 1782." **Journal of Parasitology, 46** (2), 154.

A slide of *Taenia pisiformis* showed a proglottis with two genital atria, two complete sets of male ducts and two vaginae in bilateral arrangements. Other structures and adjacent segments were normal. The origin of the material is unknown. G. I. Pozniak

1094—ANDERSON, R. C. & BOURNE, N., 1960. [Department of Parasitology, Ontario Research Foundation, Toronto 5, Ontario, Canada.] "Note on *Pontonema vacillatum* Leidy 1855 (Nematoda: Oncholaimidae) from soft-shell clams (*Mya arenaria*)." **Journal of the Fisheries Research Board of Canada, 17** (2), 291–293.

Anderson & Bourne report *Pontonema vacillatum* Leidy, 1855 from along the edge of the mantle of *Mya arenaria* at Harbour de Loutre, Seal Rock area, Campobello Island, Bay of Fundy. The identification has been confirmed by comparison with the type specimens and it is reported that the redescription given by Cobb & Steiner (1934) is inaccurate. The spicules are very much longer than the gubernaculum and the eggs are 0·235 mm. by 0·117 mm. in size. W. G. Inglis

1095—ARORA, S. & AGARWAL, S. M., 1960. [Department of Zoology, Mahakoshal Mahavidyalaya, Jabalpur, India.] "Studies on some intra-specific variations in *Paradistomum orientalis* Narain and Das collected from the gall-bladder of *Calotes versicolor* Daud: Part I. (Dicrocoeliidae: Trematoda)." **Bulletin of the Zoological Society, College of Science, Nagpur, 3,** 43–52.

Arora & Agarwal studied 157 *Paradistomum orientalis* recovered from the gall-bladder of 67 out of 74 specimens of *Calotes versicolor* examined. The parasites occurred in numbers ranging from one to 51 in different gall-bladders. A large range of morphological variations are described and illustrated and their significance is discussed. There are eight figures. M. M. Sarwar

1096—BECKLUND, W. W., 1960. [Animal Disease and Parasite Research Division, Agricultural Research Service, USDA, Beltsville, Maryland, U.S.A.] "Morphological anomalies in male *Haemonchus contortus* (Rudolphi, 1803) Cobb, 1898 (Nematoda: Trichostrongylidae) from sheep." **Proceedings of the Helminthological Society of Washington, 27** (2), 194–199.

Becklund studied variations in the morphology of *Haemonchus contortus* recovered from sheep. No abnormalities were noted in female worms and in males they were limited to spicules, gubernaculum, and dorsal ray and lobe. Material was studied from sheep treated with phenothiazine and untreated sheep; several thousand specimens from each group were examined. In the former group spicular abnormalities ranged from 0% to 47% while in the latter they ranged from 0% to 0·3%, indicating that phenothiazine increases the incidence of these abnormalities. *H. lunatus* Travassos, 1914 is placed in synonymy with *H. contortus* on the grounds that it is probably an anomalous form of the latter. W. M. Fitzsimmons

1097—CARVALHO, J. C., 1959. [Instituto Biológico de São Paulo, Brazil.] "Descrição do macho de *Scutellonema boocki* (Nematoda: Tylenchidae)." **Arquivos do Instituto Biológico. São Paulo, 26,** 41–44. [English summary pp. 43–44.]

Carvalho describes and figures the male of *Scutellonema boocki* (Lordello, 1957) Andrássy, 1958. The head is well offset with five annules, and the lateral field has four incisures irregularly aerolated at the anterior and posterior ends; a large phasmid (scutellum) is placed just posterior to the anus. The spicula is strong and arcuate, the large bursa being annulated and somewhat rounded. D. J. Hooper

1098—DEBLOCK, S. & CAPRON, A., 1960. [Laboratoire de Parasitologie de la Faculté Mixte de Médicine et de Pharmacie de Lille.] "Contribution à l'étude des Microphallidae Travassos, 1920 (Trematoda). IV. Le genre *Maritrema*: description complémentaire de *M. humile* Nicoll, 1907, de *M. linguilla* et de *M. subdolum* Jaegerskioeld, 1909." **Annales de Parasitologie Humaine et Comparée, 35** (1/2), 23–44.

Deblock & Capron give descriptions and measurements of *Maritrema humile*, *M. linguilla* and *M. subdolum* supplementary to those made by Nicoll and Jägerskiöld. Differences among

specimens of *M. subdolum* are considered to be essentially those of intraspecific variation and not anatomical ones. Significant diagnostic characteristics include: a very large cirrus pouch with exceptionally thick walls in the case of *M. humile*; a seminal vesicle twice folded upon itself and extended by a very long, sinuous intraprostatic canal in the case of *M. subdolum*; an acetabulum larger than the oral sucker, a right-hand ovary, a short thick cirrus separated from the intraprostatic canal by a pars prostatica, a long muscular metaterm and the constant presence of a seminal receptacle in *M. linguilla*. The paper is illustrated with line drawings.
N. Jones

1099—DOLLFUS, R. P., 1959. [Muséum National d'Histoire Naturelle, Paris, France.] "Sur un *Taenia* (*Multiceps*) du renard, *Vulpes vulpes* (L.) Discussion de son identification specifique." **Parassitologia. Rome, 1** (2), 143–165.

Dollfus lists the previous records of *Taenia multiceps* and *T. serialis* from foxes and then describes specimens of *Taenia* from a fox from France. Although distinctive characters emerge from a comparison of the classic descriptions of the two species, a detailed study of later records shows the distinctions to be less clear. Differences in the shape of the rostellar hooks are not readily recognizable and Dollfus proceeds to a detailed analysis of the dimensions of hooks given in previous records, a survey of the parameters used and their validity, and a comparison of these measurements with the fox material. The two species are not clearly separable on strobila characters and their possible identity is discussed. Dollfus concludes that his specimens agree rather better with *T. multiceps* in which the maximum length of fully developed hooks is slightly greater than in *T. serialis*, and that *T. serialis* is at present insufficiently characterized to be clearly distinguished morphologically from *T. multiceps*. There are 23 figures and 22 references.
J. Mahon

1100—EUZET, L., 1958. "L'oncomiracidium de *Capsala onchidiocotyle* (Setti, 1899) (Monogenoidea—Monopisthocotylea)." **Vie et Milieu. Paris, 9** (2), 211–214.

Capsala onchidiocotyle were recovered in small numbers from about 20% of *Thynnus thynnus* examined. The parasites laid eggs in sea water at 14°C., in which they hatched on the 11th to 12th days. The eggs and oncomiracidia are described and illustrated. The oncomiracidium is of the Monopisthocotylea type and it differs from all the other species of the family Capsalidae especially in the shape of the guide-bearing hooks.
N. Jones

1101—GOODEY, J. B., PEACOCK, F. C. & PITCHER, R. S., 1960. [Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, England.] "A redescription of *Xiphinema diversicaudatum* (Micoletzky, 1923 & 1927) Thorne, 1939 and observations on its larval stages." **Nematologica, 5** (2), 127–135. [German summary p. 134.]

The figures and description of *Xiphinema diversicaudatum* of Thorne (1939) appear not to agree with the originals of Micoletzky (1923 and 1927). The species is redescribed from numerous specimens which agree well with the originals. Study showed the range of variation in the tail form, the number of caudal papillae, the number of subventral papillae in the male, the variation in length of the guiding sheath of the spear compared with the spear position, and the range of form shown by the different larval stages.
J. B. Goodey

1102—HAIBA, M. H. & SELIM, M. K., 1960. [Department of Parasitology, Faculty of Veterinary Medicine, Giza, Egypt.] "Detailed study on the morphological status of *Fasciola* worms infesting buffaloes, cows and sheep in Egypt." **Zeitschrift für Parasitenkunde, 19** (6), 525–534.

The authors studied morphological variations in *Fasciola* species collected from buffaloes, cattle and sheep. Dimensions of the anterior cone and oral suckers, and the distance between the ventral sucker and the genital pore are said to show no statistically significant differences whilst the maximum diameter of the anterior cone, the length of the posterior portion, the diameter of the genital pore, the diameter of the ventral sucker and the distances between the oral and ventral suckers and the oral sucker and genital pore are held to be significantly different in specimens from different hosts. Differences are also claimed in cuticular scales, internal anatomy and ova.
T. J. Coyle

1103—HASBROUCK, E. R. & JENKINS, W. R., 1960. "Morphological variation in *Tylenchorhynchus claytoni*." [Abstract of paper presented at the 17th Annual Meeting of the Potomac Division, American Phytopathological Society, Beltsville, Md, February 25–26, 1960.] **Phytopathology, 50** (8), 571.

1104—INGLIS, W. G., DÍAZ-UNGRÍA, C. & COLES, J. W., 1960. [Department of Zoology, British Museum (Natural History), London, England.] "Nematodes de Venezuela, IV. Nematodes parásitos de vertebrados venezolanos, II. El género *Ozolaimus* (Oxyuridae: Pharyngodoninae)." **Acta Biologica Venezuelica, 3** (1), 1–24. [English summary pp. 21–22.]

Inglis *et al.* redescribe *Ozolaimus megatyphlon* and *O. cirratus* and demonstrate that they may be distinguished by the form of the oesophagus, swollen at about mid-length in *O. megatyphlon* and at the anterior end in *O. cirratus*, by the form of the papillae on the posterior ends of the male tail, raised above the surface of the tail in *O. megatyphlon* and not so raised in *O. cirratus*, the form of the spicule, needle-like in *O. megatyphlon* and swollen at the tip in *O. cirratus*, and by the relative length of the spicules which are longer in *O. cirratus* than in *O. megatyphlon*. The family Ozolaimidae Ortlepp, 1933 is not accepted and the genus *Macracis* Gedoelst, 1916 is considered indistinguishable from *Ozolaimus* which now contains five species: *O. megatyphlon*, *O. cirratus*, *O. monhystera*, *O. ctenosauri* and *O. prolixa* n.comb. for *Macracis prolixa*. W. G. Inglis

1105—KRISHNASWAMI, S. K. & ANANTARAMAN, M., 1957. [Department of Zoology, Presidency College, Madras Veterinary College, Madras, India.] "Parasites of reptiles. 1. *Paradistomum* in Indian lacertilians." **Annals and Magazine of Natural History,** Year 1956, Series XII, **9** (108), 881–887.

Krishnaswami & Ananataraman redescribe *Paradistomum orientalis* and show also that *P. moghei* Bhalerao, 1936 is a synonym of *P. orientalis*. The material described was collected from the lizard *Calotes versicolor* in Tambaram, Chingleput District, Madras. M. M. Sarwar

1106—LOGACHEV, E. D., 1958. [Kemerovski gosudarstvenni meditsinski institut, U.S.S.R.] [New data on the structure and function of excretory canals in tapeworms.] **Dokladi Akademii Nauk SSSR, 123** (2), 381–383. [In Russian.]

Histological studies of *Thysaniezia ovilla* revealed the presence of two excretory canals on each side. The structure of the lateral canal, termed parenchymatous, is more primitive than that of the medial canal, termed vascular. The products of excretion are brought into the lateral canal from the protonephridial cells by fine tubules. Anastomoses between the two types of canal were observed. It was concluded that the medial canal plays a role similar to that of a pump; hence excretion is an active process. N. Jones

1107—MILLER, G. C. & HARKEMA, R., 1960. [Department of Zoology, North Carolina State College, Raleigh, North Carolina, U.S.A.] "A new locality record for *Heterobilharzia americana* Price, 1929." **Journal of Parasitology, 46** (2), 206.

Fifteen males and thirteen females of *Heterobilharzia americana* were collected from a raccoon in North Carolina, a new locality for this parasite. The excellence of the material allowed the addition of some details to Price's original description. G. I. Pozniak

1108—OTTOLINA, C., 1958. [Academia Nacional de Medicina, Venezuela.] "El miracidio del *Schistosoma mansoni*." **Hospital. Rio de Janeiro, 53** (1), 121–159.

Ottolina reports on an extensive study of the miracidia of *Schistosoma mansoni* suspended in water or methylcellulose and stained *intra vitam* with Nile blue. W. K. Dunscombe

1109—PETTER, A. J., 1960. [Laboratoire d'Ethologie des Animaux Sauvages, Institut de Parasitologie, Faculté de Médecine, Paris, France.] "Sur une larve de subuluridé parasite de la blatte germanique (*Blattella germanica* L.)." **Comptes Rendus des Séances de la Société de Biologie. Paris, 154** (2), 300–301.

A larval subulurid, probably *Primasubulura distans* (Rudolphi, 1809), was found in the body-cavity of the cockroach, *Blattella germanica* L. collected in the Old World monkey house of the Museum. The presence of a round mouth in a larva of a three-lipped adult seems to confirm Inglis' theory [for abstract see Helm. Abs., **27,** No. 276b], on the evolution of the mouth in the subulurids. H. E. Welch

1110—PRUDHOE, S., 1957. [British Museum (Natural History), London, England.] "Cestoda." **Natural History of Rennell Island, British Solomon Islands,** Vol. 2, pp. 83–86.
Prudhoe describes *Raillietina* (*Raillietina*) *insignis* from material from *Ducula pacifica pacifica*, collected by the Danish Expedition to Rennell Island in 1951, from specimens in the British Museum (Natural History) from a "pigeon" in the British Solomon Islands, and from *Ducula badia* in Sarawak. Morphological data of these three collections are compared in a table with measurements given in Steudener's original description. In one of the Rennell Island specimens there is a segment possessing two genital pores, one on either side, but only one set of gonads and this is the first time such an anomaly has been reported in *Raillietina*. This indicates that *Cotugnia* might well have been derived directly from *Raillietina*, particularly from that group which has only one egg in each capsule. The specimens recorded as *R.* (*R.*) *insignis* from *Vinago delandii* in Africa do not appear to be identical with those from *Ducula*.
S. Willmott

1111—SCHÄLLER, G., 1960. [Institut für Obstzüchtung, Deutsche Akadamie der Landwirtschaftwissenschaften zu Berlin Naumburg/S., Weissenfelser Str. 57a, Germany.] "Beitrag zum Problem der Keimzellenbildung bei Trematodenlarven." **Zeitschrift für Parasitenkunde, 20** (2), 146–151.
Schäller has studied the genesis of the germinal cells in larval trematodes from *Tropidiscus planorbis* which developed into *Cercaria burti* (Miller, 1923) and *C. helvetica* V=VII Dubois, 1929. The author concludes that (i) two distinct epithelial layers occurred in both kinds of sporocysts, i.e. germinal and outer epithelia; (ii) cellular division was observed in the inner (germinal) layer; (iii) germinal cells, which developed both within the epithelium and isolated within the sporocyst cavity, differed from those of the outer epithelium in the degree of differentiation. The author does not exclude metagenesis in the developmental cycle of digenetic trematodes. The paper is illustrated by a photomicrograph. N. Jones

1112—SHINKADO, O., 1959. [Department of Parasitology, Faculty of Medicine, Kagoshima University, Kagoshima, Japan.] [Comparative studies on the morphology of the sheathed larvae of badger hookworm.] **Kagoshima Medical Journal, 32** (3), 219–227. [In Japanese: English summary p. 227.]
Morphological observations were made on sheathed larvae cultured from eggs of the badger hookworms, *Ancylostoma kusimaense* and *Necator miyazakiensis*, parasitic in *Nyctereutes viverrinus* Temminck which were caught in the southern part of Miyazaki Prefecture, on the Osumi Peninsula and at the foot of Mount Kirishima in Kagoshima Prefecture. Comparison was made with the sheathed larvae of human and canine hookworms. *A. kusimaense* was longer and slenderer than *A. duodenale* and *A. caninum*, but *Necator miyazakiensis* was shorter and smaller than the others. The tail end of the larva varied in shape, according to the species to which it belonged. Y. Yamao

1113—SOLIMAN, K. N., 1960. [Veterinary Research Institute, Ministry of Agriculture, El Dokki, Giza, Egypt.] "Morphological study on *Dictyocaulus arnfieldi* (Cobbold, 1884) Railliet and Henry, 1907, from a donkey in Egypt." **British Veterinary Journal, 116** (5), 191–195.
Soliman gives a description of *Dictyocaulus arnfieldi* based on specimens recovered from a donkey suffering from parasitic bronchitis in Egypt. The eggs, first-stage larvae and adults are described with observations on abnormalities in the arrangement of the bursal rays of the male tail. It is reported that the parasites lie with their heads towards the terminal branches of the trachea and their tails towards the main trunk of the bronchial tree. W. G. Inglis

1114—TIMM, R. W., 1960. [Notre Dame College, Dacca 2, East Pakistan.] "The widespread occurrence of the hemizonid." **Nematologica, 5** (2), 150.
The hemizonid is described and figured in two species of soil nematodes (*Dorylaimus* sp. and *Eudiplogaster* sp.), a marine nematode (*Stephanolaimus* sp.) and a nematode (*Leidynema appendiculatum*) parasitic in the cockroach. R. W. Timm

1115—VLADIMIROV, V. L., 1960. [Gosudarstvenni nauchno-issledovatelski institut ozernogo i rechnogo khozyaistva, U.S.S.R.] [The morphology and biology of the cercariae of *Posthodiplostomum cuticola* (Nordmann, 1832) Dubois, 1936—causing black-spot disease in fish.] **Dokladi Akademii Nauk SSSR, 135** (4), 1009–1011. [In Russian.]

Vladimirov describes in detail and illustrates the furcocercariae of *Posthodiplostomum cuticola* from sporocysts in *Planorbis planorbis* (2·7%) in the Astrakhan State Reserve. None was found in *Lymnaea stagnalis*, *Radix auricularia*, *R. ovata*, *Galba palustris*, *Physa fontinalis*, *Coretus corneus*, *Anisus contortus* or *Acroloxus lacustris*. The total number of snails examined was 4,902. The highest infection among the snails occurred during June to mid-July. The cercariae live for up to 36 hours at 24°C., show positive phototaxis and geotaxis, but no chemotaxis. They have pigmented eye spots, the ventral sucker is absent, there are three pairs of penetrating glands and the excretory system formula is $2[(2+2)+(2+2+2)]-20$. Experimental infections of young Cyprinidae produced infective metacercariae after one month at 24°C. and after three months at 16°C. No development took place at 10°C. to 12°C. N. Jones

1116—WHITLOCK, L. S. & STEELE, A. E., 1960. [Crops Research Division, USDA, Baton Rouge, Louisiana, U.S.A.] "Notes on *Hemicriconemoides gaddi* from camellias in Louisiana and Georgia." **Plant Disease Reporter, 44** (6), 446–447.

Whitlock & Steele found *Hemicriconemoides gaddi* Loos, 1949 feeding on the roots of *Camellia japonica* in Louisiana and Georgia. These specimens differ slightly from those of Loos in having an offset head and being larger with proportionately longer stylets. In some specimens the sheath tends to slip forward forming a collar about the head. D. J. Hooper

1117—ŻARNOWSKI, E. & PATYK, W., 1960. [Katedra Parazytologii, Wyższa Szkoła Rolnicza, Lublin, Poland.] "On the independence of the species *Thominx böhmi* (Supperer, 1953) and its occurrence." **Acta Parasitologica Polonica, 8** (8/20), 205–214. [Polish summary p. 213.]

A comparative analysis of *Thominx böhmi* and *T. aerophilus* shows that although these are closely related species, they can be clearly differentiated on the basis of the number of oesophageal cells (29 to 38 in *T. böhmi* and 42 to 50 in *T. aerophilus*) and the structure of the external egg-shell (which shows crater-like elevations in *T. böhmi* but is reticular in *T. aerophilus*). Furthermore, *T. aerophilus* occurs in numerous carnivorous mammals, hedgehog and man, and is localized in the lungs, bronchi, trachea and only rarely in the nasal cavity and paranasal sinuses, while *T. böhmi* inhabits the frontal sinuses, nasal cavity and paranasal sinuses and was found in foxes and, here for the first time, also in two out of four wolves and three out of six dogs from the Lublin area. G. I. Pozniak

Life-Cycle and Development

1118—CHIZHOVA, T. P. & GOFMAN-KADOSHNIKOV, P. B., 1960. [Kafedra obshchei biologii, I Moskovski ordena Lenina meditsinski institut, Moscow.] [The pattern of the natural focus of diphyllobothriasis in Lake Baykal.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (2), 168–176. [In Russian: English summary p. 176.]

An analysis of the natural focus of *Diphyllobothrium dendriticum* at Lake Baykal has shown that the principal final hosts are gulls, of which 50% were infected. Other hosts are man, cats and dogs. Experimental confirmation was obtained that *Cyclops kolensis* var. *baicalensis* and also *Epischuria baicalensis* are the primary intermediaries, while the most important second intermediary is *Coregonus migratorius* of which 80% to 100% were infected and which serves also as a reservoir of this infection. Of the deep open lake and the shallow lake biotopes examined, only the latter allows completion of the full cycle. G. I. Pozniak

1119—EWERS, W. H., 1960. [School of Biological Sciences, University of New South Wales, Sydney, Australia.] "Multiple infections of trematodes in a snail." [Correspondence.] **Nature. London, 186** (4729), 990.

Ewers reports double infections of the larval stages of a species of the heterophyid *Stictodora* and of *Austrobilharzia terrigalensis* in 3·4% of 1,146 specimens of the snail *Valacumantus* (*Pyrazus*) *australis* from Narrabeen Lake, near Sydney. The author suggests that infection

with either species may predispose the snail to infection by the other or that it is possible that eggs of both species may be present in the droppings of a single bird and that simultaneous infection may occur. C. A. Wright

1120—GINETSINSKAYA, T. A., 1960. [Leningradski gosudarstvenni universitet im. A. A. Zhdanova.] [The life-cycle of the trematode *Apharyngostrigea cornu* (Zeder, 1800), parasitic in herons.] **Dokladi Akademii Nauk SSSR, 135** (1), 236–239. [In Russian.]

Ginetsinskaya cultured *in vitro* the eggs of *Apharyngostrigea cornu*, obtained from herons. At 12°C. to 15°C. fully formed miracidia appeared on the 15th to 17th days but did not emerge from the eggs. Massive emergence was effected by a drastic increase in the temperature to 25°C. No marked effect was produced on the emergence by light. Miracidia, obtained in this way, were placed with *Planorbis planorbis*, *Anisus vortex*, *A. contortus*, *Gyraulus albus*, *Coretus corneus*, *Radix pereger* and *Lymnaea stagnalis*. *Apharyngostrigea cornu* cercariae were emitted by *Anisus contortus* after 42 days. All the other molluscs remained uninfected. The author describes the miracidium, sporocyst and, in particular, the cercaria. Identical cercariae have been described by the author from *Anisus contortus* under the name of *Cercaria contorti* Ginetsinskaya, 1959. Thus *C. contorti* is made a synonym of *Apharyngostrigea cornu*. The paper is illustrated with diagrams. N. Jones

1121—GNEDINA, M. P. & OSIPOV, A. N., 1960. [Vsesoyuzni institut gelmintologii imeni akademika K. I. Skryabina, U.S.S.R.] [The biology of the causative agent of parafilariasis in horses.] **Veterinariya, 37** (8), 49–50. [In Russian.]

After finding larvae resembling those of *Parafilaria multipapillosa* in *Haematobia atripalpis*, Gnedina & Osipov infected 206 females and 104 males of this fly by feeding them on the blood of infected horses. No *Parafilaria* larvae were found in the males but 26·2% of the females had larvae at various stages of development. Eggs and single larvae were found in the intestine of *H. atripalpis* two hours after feeding on infected blood. The larvae then migrate into the abdominal cavity, where they remain for three to five days, undergo a metamorphosis and acquire the anal opening. From the abdominal cavity they migrate into the fat body and thence into the thorax and head, where they become infective after ten to fifteen days. The authors give a detailed description and diagrams of the larvae and a bibliography which indicates that the distribution of *P. multipapillosa* and *H. atripalpis* in Russia correspond. N. Jones

1122—GOLVAN, Y. J. & THÉODORIDÈS, J., 1960. "Cycle évolutif d'un acanthocéphale parasite de gerbillidés du genre *Meriones* en Iran." **Comptes Rendus des Séances de l'Académie des Sciences. Paris, 250** (1), 224–225.

Golvan & Théodoridès report on the life-cycle of *Moniliformis merionis* which they observed in the Iranian Kurdistan in 1959. Adult parasites were found in the small intestine of *Meriones persicus*, *M. libycus erythrourus*, *M. tristrami* and *M. vinogradovi* (listed in order of frequency). Larvae were found encysted on the intestine, in the haemocoele of *Blaps*, usual commensals of these *Meriones*. Nine out of 13 *Blaps* specimens examined were parasitized, almost always with more than one of the following larval stages: acanthor, metacanthor, precanthella, acanthella and juvenile (infective stage). Some of the cysts contained up to three larvae at the same or different developmental stages. White rats were successfully infected with the juveniles recovered from *Blaps*. N. Jones

1123—GOODCHILD, C. G. & KIRK, D. E., 1960. [Department of Biology, Emory University, Atlanta, Georgia, U.S.A.] "The life history of *Spirorchis elegans* Stunkard, 1923 (Trematoda: Spirorchiidae) from the painted turtle." **Journal of Parasitology, 46** (2), 219–228, 229.

Goodchild & Kirk found *Menetus dilatatus buchanensis* and *Chrysemys picta picta* to be the natural intermediate and definitive hosts respectively of *Spirorchis elegans* in DeKalb County, Georgia. Furcocercous, apharyngeate cercariae emerged in late night and early morning hours 17 to 20 days after exposure of young *Helisoma anceps* and *Menetus d. buchanensis* to miracidia. Blood fluke eggs were passed in the faeces of young *Chrysemys p. marginata* six to ten weeks after exposure of turtles to cercariae. Life-history stages are described and illustrated. E. I. Sillman

1124—GRÉTILLAT, S., 1960. [Laboratoire Central de l'Elevage, Service de Parasitologie, Tananarive (Madagascar) et Institut de Parasitologie de la Faculté de Médicine de Paris.] "Cycle évolutif de *Carmyerius dollfusi* Golvan, Chabaud et Grétillat, 1957. Premières recherches. Formes larvaires et hôtes intermédiaires. Epidémiologie de la gastrothylose bovine à Madagascar." **Annales de Parasitologie Humaine et Comparée, 36** (1/2), 45–64.

During research on the life-cycle of *Carmyerius dollfusi* a parasite of the rumen of zebu cattle in Madagascar, Grétillat examined a large number of *Bulinus mariei*, *B. liratus* and *Anisus crassilabrum*. 5% to 25% of *B. mariei* were found to harbour various larval trematodes including *C. dollfusi* but this parasite was not found in the two other snails. A calf was infected with 72 metacercariae and on the 75th day *C. dollfusi* eggs were found in the faeces; the following day 51 adult flukes were found in the rumen. Larvae, which are described and illustrated (except the sporocysts), differ from those of *Paramphistomum cervi* by: (i) a very precocious stage of the daughter rediae and young cercariae, at the time of leaving the mother rediae, and (ii) the early cercaria being larger than the mature cercaria. Under laboratory conditions eggs developed into miracidia within 15 to 18 days at 29°C. to 30°C. [26°C. to 30°C. in the summary]. The presence of *C. dollfusi* infection in a region where *B. mariei* is absent, and the occurrence of apparently identical larval forms in *B. liratus*, caused the author to suspect that this snail is an accidental intermediate host. N. Jones

1125—GÜRALP, N. & SIMMS, B. T., 1959. "Studies on the biology of *Fasciola hepatica* in Turkey." **Veteriner Fakültesi Dergisi. Ankara Universitesi, 6** (3/4), 173–183. [Turkish summary p. 182.]

Of *Lymnaea peregra*, *Succinea* sp., *Gyraulus hebraicus* and *Lymnaea truncatula* only the last-named was found to harbour *Fasciola hepatica* larvae. It was also *L. truncatula* that was successfully infected experimentally with miracidia of this parasite; attempts to infect the other snails failed. N. Jones

1126—GÜRALP, N. & SIMMS, B. T., 1960. "Bionomics of *Fasciola gigantica* in Turkey." **Veteriner Fakültesi Dergisi. Ankara Universitesi, 7** (1/2), 1–8. [Turkish summary pp. 7–8.]

Fasciola gigantica was found in the bile-ducts of cattle and sheep at abattoirs in Turkey. Miracidia obtained from eggs recovered from gall-bladders and from flukes, were used in experimental infections of *Lymnaea truncatula*, *L. peregra*, *L. palustris* and *L. auricularia*. Only the last-mentioned snail became infected, and some of the emitted cercariae encysted on its shell. A rabbit and a lamb were infected with the fluke's metacercariae. The pre-patent period was 90 days in the former and 60 days in the latter. N. Jones

1127—HUTCHISON, W. M., 1959. [School of Pharmacy, Royal College of Science & Technology, Glasgow, Scotland.] "Studies on *Hydatigera* (*Taenia*) *taeniaeformis*. II. Growth of the adult phase." **Experimental Parasitology. New York, 8** (6), 557–567.

Strobilocerci of *Hydatigera taeniaeformis* were removed from laboratory mice, washed in balanced saline, blotted, weighed and sorted into weight groups. Within three hours, each group containing from five to ten larvae was fed by stomach tube to young cats. The cats were examined post mortem at intervals and the recovered cestodes were washed, blotted and weighed. Depending on the weight of the infective larva, 20% to 70% of the larval tissue is shed in the cat. The scolex becomes established in the small intestine and growth starts immediately. Growth rate is exponential, the worm doubling its weight in eight days, until the 18th day, when the rate slows to a doubling time of 16 days. Eggs appear in the uterus from the 16th to 18th days, when somatic growth of the mature segments ceases. Gravid segments are shed from the 36th to 42nd day. Growth rate is not affected by the age or sex of the cat host. Rabbits, dogs and ferrets are refractory to infection, but in rats the worms develop apparently normally at first although their glycogen content is low. After 48 hours, morphological abnormalities appear and the glycogen drops even lower. There are two figures and eleven references. J. Mahon

1128—IRIE, T., 1958. [Department of Pathology, Tokushima University School of Medicine, Tokushima, Japan.] [Studies on *Gnathostoma* in eastern area of Shikoku.] **Shikoku Acta Medica, 13** (2), 264–278. [In Japanese: English summary pp. 264–265.]

Studies on three species of *Gnathostoma* were carried out in the eastern area of Shikoku including Kagawa and Tokushima Prefectures from October 1955 to March 1958. Cats and

dogs were found as natural final hosts of *G. spinigerum* in Kagawa Prefecture. The infection rate was 7·2% in cats and 11·7% in dogs. 22 species of animals (six species of fish, two of amphibians, two of reptiles, 11 of birds and one of mammal) were established as natural second intermediate hosts of *G. spinigerum*. Out of 117 weasels (*Mustela sibirica itatsi*) examined, only one was a final host of *G. nipponicum*. The stomachs of 21 wild boars (*Sus scrofa leucomystax*) from Tokushima Prefecture were examined and all of them were infected with *G. doloresi* in their gastric walls. Dogs were successfully infected experimentally with larvae of *G. spinigerum* obtained from *Milvus migrans lineatus* and *Natrix tigrina tigrina*.

Y. Yamao

1129—JAMES, B. L., 1960. [Department of Zoology, University College of Wales, Aberystwyth, Wales, U.K.] "A new cercaria of the subfamily Gymnophallinae (Trematoda: Digenea) developing in a unique 'parthenita' in *Littorina saxatilis* (Olivi)." [Correspondence.] **Nature. London, 185** (4707), 181–182.

A form resembling and containing the tail-less stage of a gymnophalline cercaria, which is provisionally called "parthenita", was found in *Littorina saxatilis*. Parthenitae were found in the haemolymph of the digestive gland, gonad and gonoduct. 490 out of 14,000 *L. saxatilis* were found to be infected in Aberystwyth and 59 out of 1,100 in Plymouth (in 1959 and 1958 respectively). Five to 70 fully formed parthenitae were found per snail, each containing 20 to 2,000 tail-less cercariae. This is the first record of gymnophalline cercariae in a gastropod. Mother parthenitae were also found. Parthenitae underwent the same development as the cercariae which they contained, except that the furcocercous stage had a spineless and immobile tail.

N. Jones

1130—KISIELEWSKA, K., 1960. [Zakład Parazytologii, Polska Akademia Nauk, Warszawa, Pasteura 3, Poland.] "Life cycle of the tapeworm *Pseudodiorchis prolifer* (Villot, 1890) comb. nova (=*Pseudodiorchis multispinosa* Żarnowski, 1955)." **Acta Parasitologica Polonica, 8** (8/20), 197–204. [Polish summary p. 204.]

Kisielewska has examined 525 *Glomeris connexa* from the Białowieża National Park and found 5·6% to 13·3% to be infected with *Urocystis prolifer*. The intensity was always high. From her observations she reconstructs the stages of development and describes the fully formed larvae. Experimental infection was successful in all four *Sorex araneus* and the resulting large numbers of worms were identified as *Pseudodiorchis multispinosa*. Consequently the species is named *Pseudodiorchis prolifer* (Villot, 1890) n.comb. The parasite was also found occurring naturally in *S. araneus* in the Białowieża National Park.

G. I. Pozniak

1131—KISIELEWSKA, K., 1960. [Zakład Parazytologii, Polska Akademia Nauk, Warszawa, Poland.] "The life cycle of *Soricinia diaphana* (Chołodkovsky, 1906) Żarnowski, 1955 (Hymenolepididae)." **Bulletin de l'Académie Polonaise des Sciences, Classe II. Série des Sciences Biologiques, 8** (5), 219–222.

Kisielewska describes and figures for the first time cysticercoids of *Soricinia diaphana* which she found in the beetle *Geotrupes stercorosus* (99 out of 963 were infected) in the Białowieża forest. The cysts are yellowish-brown and spherical or slightly oval. The scolex rests on a longish neck and has four suckers and a rudimentary rostellum without hooks. Embryonal hooks are 8 μ to 12 μ long and are located either in the external envelope, the parenchymal wall of the cyst or even in the neck. This outer envelope is formed from a small prominence which appears at the end opposite to the scolex and grows to envelop the cyst. The identity of the cysticercoids was confirmed by experimental infection of *Sorex araneus*. When *Soricinia diaphana* eggs were fed to the beetles, fully developed larvae were obtained after 18 days.

G. I. Pozniak

1132—MEYER, F. P., 1960. [Iowa State University of Science & Technology, U.S.A.] "Life history of *Marsipometra hastata* and the biology of its host, *Polyodon spathula*." **Dissertation Abstracts, 21** (3), 709–710.

1133—NODA, R., 1957. [College of Agriculture, Naniwa University, Sakai, Osaka, Japan.] "Experimental studies on *Toxocara canis* infections in puppies." **Bulletin of the University of Osaka Prefecture.** Series B, **7**, 47–55.

Noda reviews the literature relating to the occurrence of post-natal infection of dogs with *Toxocara canis*. He fed embryonated eggs to 24 puppies (from birth to 30 days) and killed them at various intervals (1 to 40 days) after infection. He recorded the distribution of larvae and their lengths. His results indicate that the larvae penetrate the lower part of the small intestine and the large intestine and are thence distributed to various tissues in the body. From their distribution he concludes that tracheal migration occurs in puppies up to 30 days, but that even within this period the rate of migration is diminished with advancing age. By their relative lengths he concludes that growth rate also is decreased with age. He observed that in puppies under 20 days old, it takes about 10 days for larvae to develop to the stage at which they occur in pre-natally infected newborn puppies. Hence it is to be expected that, if puppies swallow eggs at birth, maturity will be reached at about 30 days, compared with 21 days for the pre-natally acquired infection. J. F. A. Sprent

1134—OGREN, R. E., 1957. [Ursinus College, Collegeville, Pennsylvania, U.S.A.] "Embryonic development of the tapeworm *Oochoristica symmetrica* (Cyclophyllidea: Linstowiidae)." **Proceedings of the Pennsylvania Academy of Science, 31,** 147–160.

Ogren defines and describes the six levels of differentiation of the metacestode (cysticercoid) of *Oochoristica symmetrica* featuring cellular transformation, growth, formation of "calcerous" bodies and suckers, invagination of scolex, development of flame-cell system, and attainment of final body size within 71 days after entering the beetle haemocoele. He suggests that the oncosphere of *O. symmetrica* is homologous with the stereogastrulae of other Acoelomate Bilateria, and thus proposes the names *oncosphere-stereogastrula* for the tapeworm embryo in which the oncosphere is the embryo, *embryophore-stereogastrula* for the embryo whose epidermis detatches to form a membranous embryophore around the oncosphere, and *ciliaphore-stereogastrula* to refer to the ciliated embryo (coracidium) of *Diphyllobothrium* in which the epidermis becomes ciliated. E. I. Sillman

1135—REBECQ, J., 1960. "Progénèse expérimentale de trématodes microphallidés." **Comptes Rendus des Séances de l'Académie des Sciences. Paris, 250** (9), 1724–1726.

Metacercariae of *Microphallus papillorobustus* and *Levinseniella tridigitata* recovered from *Gammarus locusta* and *Sphaeroma hoockeri*, excysted in sea water diluted four times, at a temperature of 38°C. to 40°C. and could survive for 40 to 48 hours. Under these conditions excysted as well as encysted metacercariae produced up to 40 eggs each. In some cases eggs were already observed after four hours. No eggs were observed in similarly treated *Maritrema subdolum* metacercariae. N. Jones

1136—SARIMSAKOV, F. S., 1959. [The biology of *Bunostomum trigonocephalum* (Rudolphi, 1808) in sheep and goats.] **Sbornik Nauchnikh Trudov Uzbekskoi Akademii Selskokhozyaistvennikh Nauk,** No. 13, pp. 112–118. [In Russian.]

Sarimsakov has studied the development of *Bunostomum trigonocephalum* eggs and larvae obtained from experimentally infected lambs. The eggs, still in ovine faeces, were subjected to temperatures ranging from 13°C. to 40°C. The optimum development was observed at 29°C. to 30°C. At this temperature the infective stage was reached at the end of the fourth day. The higher and lower limits, between which the eggs developed were 34°C. to 35°C. and 7°C. to 10°C. respectively. It was also found that eggs and larvae of *B. trigonocephalum* are not resistant to temperatures higher than 30°C., to freezing (−4°C. to −7°C.) or to desiccation. N. Jones

1137—SOMMERVILLE, R. I., 1960. [McMaster Laboratory, Private Bag, Glebe, N.S.W., Australia.] "The growth of *Cooperia curticei* (Giles, 1892), a nematode parasite of sheep." **Parasitology, 50** (1/2), 261–267.

The growth of the parasitic stages of *Cooperia curticei* was studied from measurements of the length of specimens of known age. Growth commenced between 48 and 72 hours after infection, before the third ecdysis. Fourth-stage larvae increased in length until the sixth day

after infection, when the lethargus commenced. This lethargus was commonly terminated by the fourth ecdysis eight days after infection but a minority of worms failed to pass the fourth ecdysis and were found in this condition in infections as old as 22 days. The first worms to reach the fifth stage ceased growth between 12 and 14 days after infection.

R. I. Sommerville

1138—WIERZBICKI, K., 1960. [Zakład Chorób Ryb, Wyższa Szkoła Rolnicza, Olsztyn-Kortowo, Poland.] "Philometrosis of crucian carp." **Acta Parasitologica Polonica, 8** (8/20), 181–196. [Polish summary p. 195.]

Of 510 *Carassius carassius* from the lakes Track and Skrwilno in northern Poland, 208 were infected with *Philometra sanguinea*. Wierzbicki found that under natural conditions the full cycle takes a year, but that in the laboratory in warm conditions two cycles can be completed. He has traced the life-cycle experimentally and was successful in infecting *Cyclops*, *Mesocyclops* and *Macrocyclops*, but not *Microcyclops* and some non-rapacious and higher crustaceans.

G. I. Pozniak

Bionomics

1139—AGOSÍN, M., 1959. [Instituto de Biologia "Juan Noé", Cátedra de Parasitología, Sección Bioquímica, Universidad de Chile.] "Bioquímica de *Echinococcus granulosus*." **Biologica. Santiago,** Nos. 27–28, pp. 3–32. [English & German summaries pp. 3–5.]

Agosín presents a detailed account of some aspects of the biochemistry of *Echinococcus granulosus* scoleces. The scoleces were obtained from sheep liver cysts. Analysis showed that scoleces contained large amounts of protein, less lipids and some inorganic substances. Electrophoresis and chromatographic techniques indicated that two polysaccharides are stored: glycogen and a polysaccharide containing galactose and glucosamine. At an oxygen tension of atmospheric air, scoleces rapidly consume oxygen. Temperature and ionic concentration of the medium influence oxygen consumption. Glycolytic inhibitors of the sulph-hydryl group affect the gaseous exchanges, particularly under anaerobic conditions. Under both aerobic and anaerobic conditions large quantities of glycogen are consumed. The final products of aerobic metabolism are, in order of quantity produced, lactic acid, acetic acid, succinic acid, pyruvic acid and ethyl alcohol. The principle product of glycogen fermentation under anaerobic conditions is also lactic acid, but pyruvic acid is absent and succinic acid is found in much smaller quantities. Lactic acid is probably produced in only two ways: glycolysis and the pentose-phosphate pathway. Cell-free extracts of scoleces contain enzymes for both reactions.

G. A. Webster

1140—BASSUS, W., 1960. [Institut für Forstzoologie der Humboldt-Universität, Berlin, Eberswalde, Germany.] "Die Nematodenfauna des Fichtenrohhumus unter dem Einfluss der Kalkdüngung." **Nematologica, 5** (2), 86–91. [English summary p. 91.]

Bassus finds that the addition of lime as calcium oxide or calcium carbonate to raw pine humus increases the nematode population by 25% to 100%. The lime never caused any decrease in population and the different dosages and forms of lime gave similar results. Nearly 50 different nematode species were observed. Cephalobinae, Monhysterinae and Tylenchinae reacted most to liming, sometimes with considerable increase in population density.

D. J. Hooper

1141—BOSHER, J. E., 1960. [Plant Pathology Laboratory, Research Branch, Canada Agriculture, Saanichton, B.C., Canada.] "Longevity in vitro of *Ditylenchus dipsaci* (Kühn) Filipjev from narcissus." **Proceedings of the Helminthological Society of Washington, 27** (2), 127–128.

Bosher collected dried *Ditylenchus dipsaci* pre-adult larval "wool" from the base of narcissus bulbs. The longevity of the *D. dipsaci* was observed when the wool was kept at room temperature (21°C.) and at 2°C. to 4°C. After seven years 78% of the nematodes revived from the wool kept at 2°C. to 4°C., but none recovered from that kept at 21°C. when soaked in shallow tap water for 24 hours. Eelworm wool in the dry state and in certain media was frozen to

−80°C. followed by vacuum dehydration and kept *in vacuo*. After five years 20·4% and 11·8% of the *D. dipsaci* revived from the lyophylized dry wool and dry wool in beef serum respectively and these nematodes were able to reproduce in narcissus bulbs. No nematodes were recovered from bulbs inoculated with dry wool in water or in 50% sucrose. D. J. Hooper

1142—BULL, P. C., 1960. [Animal Ecology Section, D.S.I.R., Wellington, New Zealand.] "Parasites of the European rabbit, *Oryctolagus cuniculus* (L.), on some subantarctic islands." **New Zealand Journal of Science, 3** (2), 258–273.

In a survey of parasites of rabbits from Kerguelen Island (one rabbit), Macquarie Island (nine rabbits) and the Auckland Islands (123 rabbits from Rose Island and 146 from Enderby), no trematodes or cestodes were recovered. From the present, and previous, records *Passalurus ambiguus* is present on Kerguelen and Macquarie but is absent from Rose and Enderby. *Trichostrongylus retortaeformis* is absent from Kerguelen but present on the other islands; *Graphidium strigosum* is very common on Rose and Enderby and absent from Kerguelen and Macquarie. The author points out that only those parasites of the rabbit in Europe which have direct life-histories, brief non-parasitic stages and high rates of infection have been successful in accompanying their hosts to new countries. Explanations are put forward for the presence of these on some islands and their absence from others. W. M. Fitzsimmons

1143—CUNNINGHAM, P. C., 1960. [Agricultural Zoology Department, University College, Dublin, Republic of Ireland.] "An investigation of winter dormancy in *Heterodera rostochiensis*." **Scientific Proceedings of the Royal Dublin Society, 1** (1), 1–4.

Cunningham discusses the previous references to this subject. He points out that the apparently conflicting findings have been reached from work carried out under different conditions of climate, time of removal of cysts from soil and time elapsed between cyst recovery and hatching test. Cunningham found marked dormancy in cysts taken in October whereas the same population taken in June and kept at 24°C. exhibited no dormancy in winter hatching tests. That is, exposure of the cysts to late summer and autumn soil conditions suppressed hatching. A. M. Shepherd

1144—DAULTON, R. A. C., 1960. [North Carolina State College, U.S.A.] "Soil temperature and soil moisture factors affecting the survival of eggs of the root-knot nematodes *Meloidogyne javanica javanica* and *M. hapla*." **Dissertation Abstracts, 20** (11), 4237.

1145—DAWSON, B., 1960. [Department of Zoology, University of Cambridge, England.] "Use of collagenase in the characterization of pseudocoelomic membranes of *Ascaris lumbricoides*." [Correspondence.] **Nature. London, 187** (4739), 799.

Dawson found that a filtrate of *Clostridium welchii*, in which the only active enzyme was collagenase, attacked the basal lamella of the intestine, the sheaths surrounding the muscle cells, and the internal part of the cuticle of *Ascaris lumbricoides*. W. P. Rogers

***1146**—DEMISHKO, P. M., 1957. [The resistance of intestinal *Trichinella* to positive and negative temperatures.] **Trudi. Kievski Veterinarni Institut, 13,** 135–138. [In Russian.]

1147—DEUBERT, K. H., 1960. [Institut für Landwirtschaftliche Zoologie, Martin-Luther Universität, Halle-Saale, East Germany.] "Über den Einfluss landwirtschaftlicher Kulturpflanzen auf die freilebenden Nematoden." **Zentralblatt für Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, Abteilung 2, 113** (11/15), 340–344.

The first part of this paper is a general discourse on the importance of soil nematodes and the factors which influence them qualitatively and quantitatively. Deubert presents graphically his view that soil type and cultivation influence the nematode fauna both directly and indirectly—through three main groups of factors, temperature-moisture, organic matter and microflora-microfauna. These groups interact with each other and the last two are affected by the nematode fauna. From his own unfinished investigations Deubert describes the changes in the nematode fauna, oxygen consumption and carbon dioxide output brought about by adding organic matter to soil, and concludes that nematodes probably influence the decomposition processes in soil indirectly—by promoting, through their excrement, rapid spread of micro-organisms. Whereas the plant parasites are closely dependent on the root amount and

activity of higher plants, the saprozoic nematodes are influenced by the nature and numbers of micro-organisms present. Study of the nematode fauna may give useful clues to the biological activities of various soils. R. D. Winslow

1148—DI EDWARDO, A. A., 1960. "Time-lapse studies of movement, feeding, and hatching of *Pratylenchus penetrans*." [Abstract of paper presented at the 17th Annual Meeting of the Potomac Division, American Phytopathological Society, Beltsville, Md, February 25–26, 1960.] **Phytopathology, 50** (8), 570–571.

1149—DUGGAN, J. J., 1960. [Agricultural Zoology Department, University College, Dublin, Republic of Ireland.] "Effect of soil drying on the viability of *Heterodera major* cysts." [Correspondence.] **Nature. London, 185** (4712), 554–555.

Cysts of *Heterodera avenae* (synonym *H. major*) dried in soil for six months or more were not viable. Cysts air-dried in soil for one or three months remained viable and the larvae which hatched produced severe symptoms on oat plants. J. J. Hesling

1150—GIRALDO CARDONA, A. J., 1960. [Instituto López-Neyra de Parasitologia y Laboratorios de Parasitologia y de Bioquímica de la Facultad de Farmacia de Granada, Spain.] "Estudio electroforético del líquido perivisceral de *Ascaris lumbricoides*." **Revista Ibérica de Parasitología, 20** (3), 425–449.

Giraldo Cardona reports on results of biochemical studies of the peri-visceral fluid of *Ascaris lumbricoides* recovered from pigs. The author concludes that: (i) the fluid contains an important quantity of proteins of low molecular weight of the polypeptide group; (ii) four protein fractions were observed in the fluid from females and three in that from males; (iii) acid gluco-proteins predominate in the fluid of males and neutral gluco-proteins in females. N. Jones

1151—GUDZHABIDZE, G. S. & PREOBRAZHENSKAYA, T. P., 1959. [Institut malyarii, meditsinskoi parazitologii i gelmintologii, Ministerstvo zdravookhraneniya SSSR.] [The effect of Actinomycetaceae, fungi and bacteria isolated from the soil of fields manured by sewage on the eggs of *Ascaris suum*.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 28** (4), 400–405. [In Russian: English summary p. 405.]

To test the influence of certain bacteria and fungi from the soil of a sewage farm on *Ascaris suum* eggs, a number of egg cultures with species of *Penicillium* and *Alternaria*, 15 species of *Actinomyces* and 9 unidentified bacteria were set up. Most of the micro-organisms proved harmless, but *A. olivaceus* and three of the bacteria were capable of retarding the development of the eggs and lowering their infectivity (tested on mice). Thus their possible use in biological control should be borne in mind. G. I. Pozniak

*1152—GUSHCHINA, A. I., 1957. [The influence of ultraviolet rays on the viability of hymenolepidid eggs.] **Sbornik Trudov. Arkhangelski Gosudarstvenni Meditsinski Institut,** No. 15, pp. 188–189. [In Russian.]

1153—JONES, A. W., SEGARRA, J. M. & WYANT, K. D., 1960. [Department of Zoology & Entomology, University of Tennessee, Knoxville, Tenn, U.S.A.] "Growth and hatching of taeniid eggs." **Journal of Parasitology, 46** (2), 170–174.

Jones *et al.* find an increase in embryophore length, oncosphere length and shell thickness of *Hydatigera taeniaeformis* ova in up to the last six proglottides of the strobila, no further morphometric changes in the terminal proglottides, uniform and prompt hatching of eggs stored in the terminal proglottides, and decreased and variable hatching of eggs stored free in saline. The authors suggest that dispersal mechanisms of taeniid species essential for their survival are related to specific differences in egg development and hatchability. E. I. Sillman

1154—KRUIDENIER, F. J. & MEHRA, K. N., 1958. [University of Illinois, Urbana, Illinois, U.S.A.] "Mucosubstances in plagiorchoid and monostomate cercariae (Trematoda: Digenea)." **Transactions of the Illinois Academy of Science,** Year 1957, **50,** 267–278.

Kruidenier & Mehra examined the development of "mucoid" glands in a variety of virgulate and non-virgulate xiphidiocercariae, and in monostome cercariae. Metachromasia of glandular secretions was tested at *p*H values between 1·0 and 6·4, and Schiff reactions were carried out.

The reactions were remarkably uniform with the xiphidiocercariae. The mucosubstances seemed to be sulphuric ester mucopolysaccharides lacking 1: 2 glycols. The reactions of mucosubstances from the plagiorchioid cercariae were markedly different from those from monostomate cercariae. W. P. Rogers

1155—LEE, D. L., 1960. [Molteno Institute, University of Cambridge, U.K.] "The effect of changes in the osmotic pressure upon *Hammerschmidtiella diesingi* (Hammerschmidt, 1838) with reference to the survival of the nematode during moulting of the cockroach." **Parasitology, 50** (1/2), 241–246.

Females of *Hammerschmidtiella diesingi* survive the moulting of *Blatta orientalis* L., but their shrunken appearance, and increase in length when taken from the host and placed in isotonic saline suggested their exposure to a hypertonic gut environment. Experiments showed that fresh female nematodes in hypotonic saline or hypertonic sucrose for 24 hours did not regain their original length after initial shrinkage, but that those in 0·2M and 0·3M sodium chloride and 50% sea-water did so; these latter nematodes also increased in length when placed in normally isotonic saline. H. E. Welch

1156—LEE, D. L., 1960. [Molteno Institute, University of Cambridge, U.K.] "The distribution of glycogen and fat in *Thelastoma bulhõesi* (Magalhães, 1900), a nematode parasitic in cockroaches." **Parasitology, 50** (1/2), 247–259.

Thelastoma bulhõesi has a similar glycogen and fat distribution to that of *Ascaris lumbricoides*. Glycogen is stored chiefly in muscle cells and lateral lines, but also occurs in the dorsal and ventral lines, intestine and oesophagus. Fat, best detected by oil red 0, occurs chiefly in the dorsal, ventral and lateral lines, intestines and female gonads. Fat was found in the intestinal lumen of several nematodes, especially male *Hammerschmidtiella diesingi*, after 24 hours' starvation. After 12 days' starvation glycogen and fat were reduced in the body but not in the gonads of female *T. bulhõesi*. H. E. Welch

1157—LEIKINA, E. S., KOTOVA, Z. N., GUSEINOV, G. A. & MAMEDOV, N. I., 1960. [Kafedra obshchei biologii, I Moskovski ordena Lenina meditsinski institut, U.S.S.R.] [The epidemiology and clinical picture of ancylostomiasis in the Lenkoran district of Azerbaidzhan S.S.R. Part 2. Experimental data on the development and survival of *Necator americanus* larvae in the soil.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (2), 161–168. [In Russian.]

Faeces containing *Necator americanus* eggs were mixed with sterilized soil and placed in bowls with perforated bottoms in a lowland zone and a foothill zone (three stations in each zone) in the Lenkoran district of Azerbaidzhan S.S.R. from 5th May till 1st August. The soil temperature ranged from 10°C. to 40°C., the soil humidity from 7% to 40% and the *p*H from 5·5 to 6·0. The length of time needed by the eggs to develop into infective larvae varied from one to eleven days and was inversely proportional to the soil temperature. At 40°C. larval development ceased. Soil humidity appeared to have less influence on development but 7% was the minimum at which development occurred. The larvae survived for 5 to 40 days, depending on the temperature and humidity of the soil. N. Jones

1158—LEWIS, G. D. & MAI, W. F., 1960. [Department of Plant Pathology, Rutgers University, New Brunswick, New Jersey, U.S.A.] "Overwintering and migration of *Ditylenchus dipsaci* in organic soils of southern New York." **Phytopathology, 50** (5), 341–343.

Lewis & Mai sampled three fields with organic soils infested with *Ditylenchus dipsaci*. Sampling was at three-weekly intervals over a year or more, mainly at six and twelve-inch depths. From their observations they conclude that *D. dipsaci* overwinters in organic soils of southern New York mainly as adults or pre-adult larvae. There was evidence of some downward migration in the autumn and some upward migration in the spring. Mortality was high in the portion of the soil which became frozen. *D. dipsaci* can persist in the soil in the absence of a host crop for at least two years. In relation to onion growing it is suggested that late August to early September will be the best time for fumigation of infested soil, just after the onions have been harvested but before the downward migration of the *D. dipsaci*. D. J. Hooper

1159—NAGAMOTO, T. & OKABE, K., 1959. [Department of Parasitology, Kurume University School of Medicine, Kurume, Japan.] [The oxygen consumption of *Clonorchis sinensis* and the effect of some drugs on its gaseous metabolism.] **Journal of the Kurume Medical Association, 22** (10), 3757–3759. [In Japanese: English summary p. 3759.]

The amount of oxygen consumed by *Clonorchis sinensis* kept in saline solution at 37°C. averaged 6·4 μl. in one hour, and 10·79 μl. in two hours, the increase giving a straight line graph. 0·03% solutions of resochin and stibnal (sodium antimony tartrate) inhibited the gaseous metabolism of the fluke in the same degree. W.B.A.2152 (2-metoxy-9-(2-(2: 3-dihydroxypropyl-amino)-ethylamino)-1: 10-diazanthracene dihydrochloride) was not effective at all. Y. Yamao

1160—NENOW, S., 1960. [Institute of Parasitology, Sofia, Bulgaria.] "Wpływ promieni słonecznych na jaja *Ascaris lumbricoides* przy różnych wysokościach nad poziomem morza." **Wiadomości Parazytologiczne, 6** (2/3), 189–196. [English summary p. 196.]

The effect of direct sunlight was investigated on fresh and infective *Ascaris lumbricoides* eggs at different altitudes (0 to 2,376 m. above sea level) in an area approximately between 22° to 28° East and 41° to 44° North. Eggs on cellophane paper were put in a small glass crystallizer, immersed in a container of water of given temperature (12–15°C. or 25°C.), placed outside during July and August from 8 a.m. onwards and examined for viability every 30 min. for up to 480 min. The tabulated results show that the sun was most quickly lethal between 11 a.m. and 1 p.m., when it was richest in ultra-violet light, but did not kill the eggs in the afternoon. At mid-day the fresh eggs were killed in 300 to 390 min. at the lower altitudes and in 210 to 240 min. at 2,376 m., while infective eggs were killed in 390 to 450 min. and in 240 to 300 min. respectively. G. I. Pozniak

1161—OLSEN, L. S. & KELLEY, Jr., G. W., 1960. [Department of Animal Pathology, University of Nebraska, Lincoln, Nebraska, U.S.A.] "Some characteristics of the early phase of migration of larvae of *Ascaris suum*." **Proceedings of the Helminthological Society of Washington, 27** (2), 115–118.

The progress of migration and growth of larvae of *Ascaris suum* was determined in piglets, rats and mice three days after experimental infection with 10,000 or 100,000 eggs. The larger dose resulted in accelerated migration of the larvae in mice (but not rats and piglets) and caused a reduction in the average size of larvae from the liver, lungs and stomach. The smaller doses in all three hosts produced larvae in the lungs which were significantly smaller than those in the liver. In hosts where larvae were found in the stomach (all high-dose mice and one high-dose rat) these were significantly smaller than those in the lungs. Some possible explanations of these unexpected size differences are given. G. I. Pozniak

***1162**—PANIN, V. Y., 1957. [The biology of the trematodes *Prosthogonimus ovatus* (Rud., 1803) and *P. cuneatus* (Rud., 1809), parasites of the bursa Fabricii and oviduct of wild and domestic birds.] **Izvestiya Akademii Nauk Kazakhskoi SSR. Seriya Biologicheskaya, 2** (14), 53–65. [In Russian.]

1163—PRASAD, D., 1959. [Department of Zoology, Science College, Patna, Bihar, India.] "The effects of temperature and humidity on the free-living stages of *Trichostrongylus retortaeformis*." **Canadian Journal of Zoology, 37** (3), 305–316.

Prasad has studied the effects of temperature and humidity on *Trichostrongylus retortaeformis* eggs and larvae obtained from experimentally infected rabbits. Under laboratory conditions the optimum temperature for the development of eggs was 25°C. in wet faecal cultures. At this temperature infective larvae were obtained within three to five days. At 3°C. to 5°C. 7% to 9% of the eggs developed into infective larvae within eight to ten weeks. Eggs and larvae were more resistant to low temperatures than to high. Eggs hatched best when actually wet, some hatching at a relative humidity of 98%. Both eggs and larvae survived desiccation for considerable periods. N. Jones

1164—ROHDE, R. A., 1960. [Department of Entomology and Plant Pathology, University of Massachusetts, Amherst, Massachusetts, U.S.A.] "Acetylcholinesterase in plant-parasitic nematodes and an anticholinesterase from asparagus." **Proceedings of the Helminthological Society of Washington, 27** (2), 121–123.

The presence of cholinesterase was demonstrated by histochemical staining in several species of plant-parasitic nematodes. The most intensively stained areas were the various parts of the nervous system.

H. R. Wallace

1165—ROHDE, R. A., 1960. [Department of Entomology and Plant Pathology, University of Massachusetts, Amherst, Massachusetts, U.S.A.] "The influence of carbon dioxide on respiration of certain plant-parasitic nematodes." **Proceedings of the Helminthological Society of Washington, 27** (2), 160–164.

The oxygen consumption of several species of plant-parasitic nematodes was determined using the Cartesian diver ultra-microrespirometer. The respiration rate decreased constantly from time of removal from the host plant until the death of the nematodes. Rohde showed that the respiration rate for *Pratylenchus penetrans*, *Hoplolaimus tylenchiformis* and *Meloidogyne hapla* was higher in air than in vessels without carbon dioxide or with carbon dioxide levels higher than that of air.

H. R. Wallace

1166—RONALD, K., 1960. [Department of Entomology and Zoology, Ontario Agricultural College, Guelph, Ontario, Canada.] "The effects of physical stimuli on the larval stage of *Terranova decipiens* (Krabbe, 1878) (Nematoda: Anisakidae). I. Temperature." **Canadian Journal of Zoology, 38** (3), 623–642.

Larvae of *Terranova decipiens* from the muscle of the cod (*Gadus callarias*) survived longer at temperatures below −2·5°C. when in fish muscle than when in 33% sea-water or on moist filter paper. However, between −2·5°C. and 2·5°C. mortality in fish muscle was greater than in diluted sea-water, but at higher temperatures this relationship was again reversed. The optimum temperature for survival lay between −2·5°C. and 7·5°C. Above 7·5°C. mortality increased, fell at 35·5°C. but increased again at higher temperatures. The longest larvae were the least resistant at all temperatures, while the shortest were more resistant at low and high temperatures, and larvae of medium length were more resistant to intermediate temperatures. The greatest number of larvae penetrated fish muscle when the temperature was 15°C. In temperature gradients between 0°C. and 40·5°C., larvae were positively thermotactic up to 35·5°C. and negatively thermotactic above this temperature. Motility was proportional to temperature but the frequency of movement decreased as viability decreased at higher temperatures.

R. I. Sommerville

1167—SAITO, S., 1960. [Department of Parasitology, School of Medicine, Keio University, Tokyo, Japan.] [Studies on the respiratory metabolism of *Ascaris* eggs. 2. Effect of inhibitors and cobalt-60 irradiation on methylene blue decolorization activity of *Ascaris* eggs.] **Japanese Journal of Parasitology, 9** (3), 232–238. [In Japanese: English summary p. 238.]

The effect of some respiratory inhibitors and irradiation with radio-active cobalt-60 on the respiration of *Ascaris* eggs was studied. Among the inhibitors tested, pentachlorophenol was most effective showing a complete inhibition at a concentration of M/5,000 and 56% inhibition even at M/50,000. With cobalt-60 irradiation, small doses (under 320× 10r.) stimulated the methylene blue decolorization activity but large doses (820× 10r.), however were inhibitory.

Y. Yamao

1168—SAITO, S. & KAWAZOE, Y., 1960. [Department of Parasitology, School of Medicine, Keio University, Tokyo, Japan.] [Studies on the respiratory metabolism of *Ascaris* eggs. 1. Relation between the developmental stages of the eggs and the methylene blue decolorization activity.] **Japanese Journal of Parasitology, 9** (3), 227–231. [In Japanese: English summary p. 231.]

The methylene blue decolorization activity of homogenized eggs of *Ascaris lumbricoides* in various developmental stages, was evaluated by Thunberg's method with sodium succinate as substrate. The maximum rate of decolorization was at *p*H 9·4. The optimum temperature for decolorization was 30°C. The highest activity was recognized in eggs at the morula stage.

Y. Yamao

1169—SHEPHERD, A. M., 1960. [Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, England.] "A study of the apparent decay of eggs within cysts of *Heterodera schachtii* Schmidt and *H. göttingiana* Liebscher, and of free larvae in soil." **Nematologica, 5** (2), 103–110. [German summary p. 110.]

In experiments with cysts of *Heterodera schachtii* and *H. göttingiana* kept either in water or in soil at different moisture contents for eight weeks, there was no evidence that many eggs are lost in cysts from decay. Most of the loss of cyst contents in soil can most probably be attributed to emergence of larvae. The microflora present may give rise to occasional epidemics, especially under the conditions of hatching tests, causing the losses sometimes encountered. Larvae of *H. schachtii* were found to decline rapidly in number, in the absence of a host plant, in soil with a moisture content corresponding to field capacity. They are apparently very sensitive to soil conditions, which largely determine the rate at which they succumb.

A. M. Shepherd

1170—STELTER, H. & RAEUBER, A., 1960. [Institut für Pflanzenzüchtung Gross-Lüsewitz der Deutschen Akademie der Landwirtschaftswissenschaften zu Berlin.] "Untersuchungen über den Kartoffelnematoden (*Heterodera rostochiensis* Wollenweber). VII. Weitere Untersuchungen über die Veranderung einer Nematodenpopulation unter dem Einfluss widerstandsfähiger und anfälliger Kartoffelvarietäten in Topfversuchen." **Biologisches Zentralblatt, 79** (4), 455–463.

To confirm their previous findings on the effects of susceptible and resistant potatoes on reproduction of *Heterodera rostochiensis* [for abstract see Helm. Abs., **30**, No. 471], Stelter & Raeuber retested the commercial variety Aquila and four *andigenum* crosses by growing them in 1959 in the pots of eelworm-infested soil in which they had been grown in 1958. Following the changes in numbers of encysted eelworms over the season, they found results in good agreement with those of 1958, Aquila and the susceptible cross promoting large nematode numbers compared with the three resistant crosses. The figures after two seasons of growth were 952, 969, 3, 7 and 3 larvae per c.c. of soil respectively. In a parallel experiment, Aquila was compared with four other resistant *andigenum* crosses, one maturing comparatively early and the other three later. Although the early cross caused earlier hatching of the nematode, it did not differ from the other three in its final effect on nematode density, the end-of-season figures being 1,518 larvae per c.c. of soil for Aquila and 42 to 79 for the four crosses.

R. D. Winslow

1171—THOMAS, R. J. & STEVENS, A. J., 1960. [Department of Veterinary Services, P.O. Onderstepoort, Transvaal, South Africa.] "Ecological studies on the development of the pasture stages of *Nematodirus battus* and *N. filicollis*, nematode parasites of sheep." **Parasitology, 50** (1/2), 31–49.

Thomas & Stevens, working in north-east England, failed to infect lambs by allowing them to graze during the summer on a pasture which had been heavily contaminated with eggs of *Nematodirus battus* and *N. filicollis* during the spring. Lambs grazing the same pasture during the following spring acquired heavy infections. Samples of grass were examined for larvae during this period. No larvae were detected during the summer. Infective larvae of *N. filicollis* were first recovered at the end of October and small numbers were found throughout the winter. Although some larvae of *N. battus* were found in November, no further larvae of this species were found until the following March. From this time until early summer large numbers of larvae of both species were found. Experiments in which samples of faeces containing *Nematodirus* eggs were placed on soil in pots of rye-grass were started at different times during the year. The stage of development of the eggs was determined by monthly sampling. Most eggs exposed during spring and summer developed to the infective stage by autumn. They overwintered without hatching. Eggs exposed in autumn and winter did not complete their development until the following spring and early summer. The time of hatching was not related to the time of initial exposure, most eggs hatching in late spring. The authors refer to the delayed hatching of eggs laid in spring and summer as dormancy and describe experiments from which they conclude that hatching is a response to a rise in temperature after sensitization by exposure to low temperatures. The observations are discussed in relation to the epidemiology of *Nematodirus* infections.

H. D. Crofton

1172—UOTANI, K., 1960. [Department of Parasitology, Institute for Infectious Diseases, University of Tokyo, Tokyo, Japan.] [Studies on *Rhabditis* sp. isolated from human urine. 2. Studies on biological characters of the nematode.] **Japanese Journal of Parasitology, 9** (3), 328–335. [In Japanese: English summary p. 335.]

In *Rhabditis* sp. (Ogu-*Rhabditis*), the average period from hatching to death was 14·6 days ranging from 10 to 22 days under the proper conditions of culturing. In general they reached maturity at 25°C. in about four days. The results of survival tests indicated that the nematode entered the human body through the mouth with either contaminated water or uncooked, slightly seasoned food. It was also observed that the worm could develop in the urine of patients suffering from nephritis, nephrosis or chyluria, but not of a healthy man. Y. Yamao

1173—UOTANI, K., 1960. [Department of Parasitology, Institute for Infectious Diseases, University of Tokyo, Tokyo, Japan.] [Studies on *Rhabditis* sp. isolated from human urine. 3. Experimental infection to animals.] **Japanese Journal of Parasitology, 9** (3), 336–338. [In Japanese: English summary p. 338.]

Rhabditis sp. (Ogu-*Rhabditis*) was given to mice by a stomach tube. The distribution of the worms in the mice was examined one hour to three days after introduction. The results obtained indicated that the species of *Rhabditis* could penetrate animal tissues and migrate to various organs. Y. Yamao

1174—VILLAKO, K. & KHANGE, L., 1957. [Kafedra biokhimii, Tartuski gosudarstvennii universitet, U.S.S.R.] [Pathogenesis of *Diphyllobothrium* anaemia.] **Voprosi Meditsinskoi Khimmii. Moscow, 3** (1), 7–9. [In Russian: English summary pp. 8–9.]

The dry weight of *Diphyllobothrium latum*, expressed as a percentage of the dry weight, contained an average of 14 μg. % cobalt (equivalent to 300 μg. % of vitamin B_{12}) and 3.6 μg. % to 4·4 μg. % of copper, values far exceeding amounts in the human liver. The data support the view that endogenic vitamin B_{12} deficiency caused by the worms absorbing cobalt plays an important part in the development of anaemia, and show that copper deficiency may also be of pathogenic significance. G. I. Pozniak

1175—VON BRAND, T., 1959. [U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Allergy & Infectious Diseases, Bethesda, Maryland, U.S.A.] "Influencia del tamaño, motilidad, ayuno y edad sobre la actividad metabólica." **Biologica. Santiago,** Nos. 27–28. pp. 117–128.

It is impossible to indicate, in a brief abstract, the whole content of this paper. The original must be read. After a short introduction von Brand quotes Rubner's conclusion that the metabolic rates of animals varying in size are constant in relation to a unit of surface area and discusses the difficulty of defining this term and the possible avoidance of this difficulty by relating the metabolic rate to the body-weight. In some cold-blooded animals (newts, some molluscs) the law of surface area, expressed in relation to two-thirds of the body-weight, seems adequate to express the relation between size and the metabolic index; but in others (insects, *Helix*) metabolism increases in proportion to increase in size and in others an intermediate relation exists. Allometric plotting of the weight per individual and the oxygen consumption is then discussed and illustrated by graphs of data obtained from large and small free-living and parasitic nematodes. Von Brand then discusses work on respiratory enzymes and mitochondria and on the influence of muscular work, e.g. the study of insects in flight and at rest, of crawling and swimming in nematodes and of floating by planktonic organisms. Finally the influence of age is discussed. For the study of this von Brand thinks that the nematodes, many of which have a long larval and a short adult life, are admirably suited. G. Lapage

1176—YANAI, T., 1960. [Department of Parasitology, Research Institute for Microbial Diseases, Osaka University, Osaka, Japan.] [Studies on the behaviour and fate of various ascarid eggs placed outside the intestine of the host. 3. On the development of the eggs of *Ascaris lumbricoides* from swine in the peritoneal cavities of poikilothermal animals.] **Japanese Journal of Parasitology, 9** (1), 32–41. [In Japanese: English summary p. 41.]

A factor influencing development of the eggs of *Ascaris lumbricoides* from pigs within the human body was studied by inoculating them into the peritoneal cavity of frogs, *Rana nigromaculata*, and Japanese goldfish. In frogs at an outdoor temperature of 30°C. to 32°C., 10%

of the inoculated eggs were found embryonated after 14 days and 90% after 21 days. In the goldfish, at a water temperature of 26°C. or 29°C. to 30°C., 2% to 3% of them were found to be embryonated when examined after 21 or 28 days. Y. Yamao

Pathogenesis

1177—ATA, A. E. A., 1959. [Cairo University, Egypt.] "Haematological study in bilharzial hepatolienal fibrosis. 'Syndrome of Egyptian hepatosplenomegaly'." **Journal of the Egyptian Medical Association, 42** (4/5), 285–301.

Ata made a detailed study of the blood changes in 300 cases of bilharzial hepatolienal fibrosis. No less than 119 had a haemoglobin level of less than 55%, and in 177 the red cell count was below four million. The anaemia was of the hypochromic normocytic type and there was no relation between the size of the spleen or liver and the degree of anaemia. Leucopenia was usually present but eosinophilia was not a constant feature. Reduction in thrombocytes and neutrophils occurred in nearly 50% of cases. Splenectomy did not always correct the anaemia. In no instance was the platelet count below 150,000. W. K. Dunscombe

1178—CAMPBELL, J. A. & GARDINER, A. C., 1960. [Parasitology Department, Moredun Institute, Edinburgh, Scotland.] "Anaemia in trichostrongylid infestations." **Veterinary Record, 72** (46), 1006–1011. [Discussion pp. 1011–1014.]

The authors review the literature on anaemia of domestic ruminants associated with infections by the Trichostrongylidae, mainly *Haemonchus* and *Trichostrongylus*. They examine and discuss the evidence in an attempt to discover (i) by what mechanism the blood changes are produced, and (ii) how the changes are related quantitatively to the infection which produces them. It appears that gastric haemorrhage plays a dominant part in *H. contortus* infections whereas dyshaemopoiesis is more characteristic of *T. axei* infections. Helminth reproductive activity seems to play a part and, in the case of haemonchiasis, reproductive adults have a much greater effect on production of anaemia than do developing larvae. W. M. Fitzsimmons

1179—CHAUDHURI, R. N. & SAHA, T. K., 1959. [Clinical Research Unit, (Indian Council of Medical Research), Calcutta School of Tropical Medicine, India.] "Tropical eosinophilia: experiments with *Toxocara canis*." **Lancet,** Year 1959, **2** (7101), 493–494.

24 guinea-pigs were each given 1,000 to 1,400 embryonated eggs of *Toxocara canis* intragastrically. Three weeks later their eosinophil counts had risen from about 3% to 30–55%. X-rays of three out of four of them showed lung mottling and three animals which were killed had scattered reddish patches on the lungs and whitish granules on the liver. Another series of 24 guinea-pigs were given repeated feeds of 450 to 500 embryonated eggs of *T. canis* daily for 14 days. All showed hypereosinophilia (up to 51%) which lasted longer; five showed respiratory distress. Lung changes appeared in X-rays of two of three animals. A volunteer who was given 100 embryonated eggs of *T. canis* by mouth showed an eosinophil increase of 26% in 13 days and 52% on the 30th day. Later he developed an irritant cough, worse at night. "This symptom and persistent massive eosinophilia simulate tropical eosinophilia."

J. J. C. Buckley

1180—CHENG, T. C. & JAMES, H. A., 1960. [Department of Biology, Lafayette College, Easton, Pennsylvania, U.S.A.] "The histopathology of *Crepidostomum* sp. infection in the second intermediate host, *Sphaerium striatinum*." **Proceedings of the Helminthological Society of Washington, 27** (1), 67–68.

Cheng & James found large numbers of dead shells of *Sphaerium striatinum* in Sinking Creek, Giles County, Virginia. A thorough search produced 100 living specimens, most of which were infected with first and second generation rediae of *Crepidostomum cornutum*. 25 of the clams which were not shedding cercariae and which proved, on dissection, to be uninfected were gravid females; all of the males examined were heavily infected. The mother rediae were on the gills of the host and the daughters were in the digestive gland. Sections showed that the digestive gland was almost completely destroyed and phase-contrast microscopy revealed the presence of cells of this organ in the caecae of several living daughter rediae.

C. A. Wright

1181—DROPKIN, V. H. & NELSON, P. E., 1960. [Crops Research Division, ARS, USDA, Beltsville, Maryland, U.S.A.] "The histopathology of root-knot nematode infections in soybeans." **Phytopathology, 50** (6), 442–447.

By means of serial sections of soya bean (*Glycine max*) roots Dropkin & Nelson studied the histological reactions of 19 varieties to invasion and development of the root-knot nematodes *Meloidogyne incognita* and *M. incognita* var. *acrita*. In susceptible varieties there was no obvious damage to the cortex but from the third day after invasion there was intense cell multiplication around the larval head. A few cells in contact with the head enlarged greatly and coalesced with adjacent cells. In the giant cells thus produced mitoses ceased after the first few days but nuclei were added from the coalescing cells. Four types of giant cells are described but nematodes develop vigorously in only one type, that in which the large multinucleate cells have dense, evenly granular cytoplasm and greatly thickened walls. The nuclei may be large with large nucleoli or smaller and clustered in groups towards the centre of the cell. Unsatisfactory development of nematodes is associated with giant cells which are only slightly enlarged or have vacuolated cytoplasm, or cell walls only partly thickened. It is concluded that resistance of soya beans to root-knot nematodes is shown by cell reaction, but the size of the nematodes and egg masses could not be correlated with the size of the giant cells. M. T. Franklin

1182—DUKE, B. O. L., 1960. [Helminthiasis Research Unit of the West African Council for Medical Research, Kumba, Southern Cameroons, U.U.K.A.] "Studies on loiasis in monkeys. III. The pathology of the spleen in drills (*Mandrillus leucophaeus*) infected with *Loa*." **Annals of Tropical Medicine and Parasitology, 54** (2), 141–146.

Duke describes the macroscopic and microscopic changes that are associated with the destruction of microfilariae in the spleens of drills infected with *Loa*. Numerous granulomatous nodules, which developed in the red pulp and which caused distension of the capsule of the organ, were found on the surface of the subscapular region, particularly along the upper and lower edges of the organ. Microscopically, each nodule was composed of a spherical honeycomb of reticulin fibrils, upon which framework were reticulin cells and large numbers of macrophages. The elements of the circulating blood and numerous eosinophils passed between the spaces of the honeycomb and multinucleate giant cells, which frequently contained disintegrating microfilariae, were found throughout the granulomata. The lesions were resolved and the appearance of the spleen returned to normal when diethylcarbamazine was administered, the rapid destruction of microfilariae immediately after treatment with this drug taking place in the reticulo-endothelial system of the liver and not in the nodules in the spleen. Because evidence of similar changes in the human spleen is lacking, it is suggested that these changes are peculiar to loaiasis in the simian host. P. Williams

1183—GALLAGHER, C. H. & SYMONS, L. E. A., 1959. [McMaster Animal Health Laboratory, C.S.I.R.O., Glebe, N.S.W., Australia.] "Biochemical studies on *Nippostrongylus muris* infestation." **Australian Journal of Experimental Biology and Medical Science, 37** (4), 421–432.

Gallagher & Symons found that anaerobic and aerobic respiration in livers of rats infected with *Nippostrongylus muris* was normal. Glycolysis in jejunal tissue of infected rats was also normal but oxidative phosphorylation in mitochondria from this tissue was uncoupled. This was due to a high calcium concentration; when ethylenediaminetetracetic acid was added metabolism was normal. *N. muris* has a high calcium concentration, especially in the cells of the gut, and it was considered that parasites homogenized inadvertently with infected jejunal mucosa supplied the calcium to uncouple oxidative phosphorylation. Gallagher & Symons conclude that *N. muris* does not interfere with the host's intermediary metabolism. W. P. Rogers

1184—GIORDANO, A., 1959. [Università di Napoli, Istituto di Patologia Generale ed Anatomia Patologica Veterinaria, Napoli, Italy.] "Il midollo osseo nella distomatosi dei giovani bufali." **Acta Medica Veterinaria. Naples, 5** (1/2), 67–72. [English & French summaries p. 71.]

Giordano has studied the bone marrow of 14 young buffaloes with liver-fluke. In most of the cases chronic angiocholitis and hepatic sclerosis were observed. Studies of the myelogram revealed a reduction of erythropoietic activity and an increase in leucopoiesis. Increase in the number of reticulocytes and reduction in the number of the red maturation elements was also observed. N. Jones

1185—HAMADA, M., 1959. [Department of Pathology, School of Medicine, Tokushima University, Tokushima, Japan.] [Studies on experimental paragonimiasis.] **Shikoku Acta Medica, 14** (3), 417–438. [In Japanese: English summary pp. 417–418.]

Metacercariae of *Paragonimus westermani* were given *per os* to dogs. After 23 days the worms were found in the lungs, and in 35 days acute inflammation was noted around the worms which thereafter became chronic. 35 days after the beginning of the experiment, histochemical studies of the tissues surrounding the parasite revealed a remarkable increase of alkaline and acid phosphatase activities, with a decrease in polysaccharides and nucleic acids. After 40 days these changes were less notable and after 90 days they were almost gone. The existence of glycogen was observed in mesenchyme, vitelline glands, suckers, pharynx, subcuticular layer and ovary of the flukes. Polysaccharides other than glycogen were noted in the intestine, vitelline glands and ovary. Acid phosphatase was seen in almost all the organs and was always abundantly found in the intestinal epithelium and subcuticular layer. Alkaline phosphatase was noted only in the excretory organ. Nucleic acids, RNA as well as DNA, were densely distributed in spermatids, eggs and vitelline glands, less densely in the intestinal epithelium and Mehlis' gland, and sparsely distributed in the subcuticular layer, suckers and pharynx. When the infected dogs were treated with emetine, a remarkable decrease was noted in the glycogen of the mesenchyme and subcuticular layer, acid phosphatase of the intestinal epithelium and subcuticular layer and in nucleic acids of the vitelline glands, ovary and testes.

Y. Yamao

1186—ISAKA, K., 1959. [Department of Surgery, Osaka Red Cross Hospital, Osaka, Japan.] [Experimental studies on canine paragonimiasis. 3. Changes of blood picture after reinfection with *Paragonimus*.] **Japanese Journal of Parasitology, 8** (6), 1005–1013. [In Japanese: English summary p. 1013.]

The blood picture, serum protein, calcium, potassium and blood sugar content of dogs experimentally reinfected with *Paragonimus westermani* on the ninth week after the initial infection, were studied. In the reinfected cases, a tendency to develop hypochromic anaemia with considerable leucocytosis and eosinophilia was noted. The serum albumin and globulin levels showed an increase, particularly during the third week of the reinfection. Since the degree of the increase was higher in serum globulin than in serum albumin, the A/G ratio was reduced. It seems that the earlier the A/G ratio decreased the more the pathological changes developed. Serum calcium and potassium showed an increase with their peaks about the third week of the reinfection. Since serum calcium increased more than potassium, the K/Ca ratio was remarkably reduced. There was, however, no definitive relationship between the variation of the K/Ca ratio and the development of the disease. Blood sugar showed a slight decrease. These findings are suggestive of an allergic reaction.

Y. Yamao

1187—ISAKA, K., 1959. [Department of Surgery, Osaka Red Cross Hospital, Osaka, Japan.] [Experimental studies on canine paragonimiasis. 4. Morphological studies on the pulmonary vessels after reinfection with *Paragonimus*.] **Japanese Journal of Parasitology, 8** (6), 1014–1019. [In Japansese: English summary p. 1019.]

Pulmonary vessels in dogs experimentally infected with *Paragonimus westermani* were investigated by resin cast. The bronchial artery in the reinfected dogs was enlarged three to four times more than the normal size and was more dilated than in the case of the primary infection. The pulmonary artery showed similar changes, as described in previous reports. The bronchial artery showed a remarkable enlargement and a distortion from the initial part to the periphery. The network of small vessels in the bronchial wall became finer and more dilated especially around the worm cyst. Numerous anastomoses between the bronchial artery and the pulmonary artery were recognized, one of which was 1·6 mm. in diameter, i.e. twice as large as the dilatation of the primary infection.

Y. Yamao

1188—KHO, I. K., YAN, U. K. & MAO, S. P., 1960. [Histopathological investigations of the liver in experimental schistosomiasis japonica.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (2), 179–183. [In Russian: English summary p. 183.]

In mice infected by subcutaneous injection of cercariae of *Schistosoma japonicum*, the pathological changes in the liver, which were first seen after one week and corresponded with the

maturation of the worms, were round cell infiltration later giving rise to focal or coagulation necrosis, mitosis of liver cells, peripheral cell infiltration, peri- and endophlebitis and thrombosis of the portal veins, and proliferation of bile-ducts with hypertrophy of the epithelial layer and presence of eosinophil granules or crystals in the lumen. Similarly, injection of parasite extracts into the liver of guinea-pigs caused round cell infiltration of the periportal system. Eggs developing in the liver of guinea-pigs caused the formation of acute abscesses followed by fibrous tubercles. The appearance of fine rays and later eosinophilic crystals around developing eggs is thought to be a pathological reaction of immunological character.

G. I. Pozniak

1189—KUWAMURA, T., 1958. [Department of Pathology, Tokushima University School of Medicine, Tokushima, Japan.] [Study on experimental clonorchiasis especially on the histochemical change in the liver.] **Shikoku Acta Medica, 12** (1), 28–57. [In Japanese: English summary pp. 28–30.]

Rabbits were fed with *Pseudorasbora parva* collected in the endemic clonorchiasis region of Tokushima Prefecture. All the experimental animals became infected with *Clonorchis sinensis*. The infected sites in the liver were, in order of frequency, right lobe, left lobe, bile-duct outside the liver, quadrate lobe and caudate lobe. In the earlier stage (10 to 50 days) of clonorchiasis, the function of the liver cells was depressed and the content of nucleic acids, proteins and polysaccharides was reduced. The positive reaction of alkaline phosphatase was high. The positive reaction of acid phosphatase increased transiently, decreasing by the 60th day. There was a compensation period between the 60th and 90th day after infection when an almost normal condition obtained. After the 100th day cirrhosis appeared and the content of all essential cell components decreased markedly. The liver function tests revealed that a continuous hepatic disturbance existed between the 10th to 30th day and also after the 70th day of infection. Histochemical findings revealed that the cobalt reaction indicated the current state of liver function with a certain accuracy. By electrophoretic studies, a decrease in albumin and an increase in globulin were observed.

Y. Yamao

1190—NAKAMURA, F., 1959. [Department of Pathology, Osaka Medical College, Takatsuki, Osaka, Japan.] [Experimental pathological studies on the granuloma by *Ascaris* eggs. I. On the difference between sensitized rabbits with *Ascaris* ova extract and unsensitized ones.] **Japanese Journal of Parasitology, 8** (6), 972–991. [In Japanese: English summary p. 991.]

An experiment was made on the granuloma produced by *Ascaris* eggs. Rabbits were sensitized with extracts of *Ascaris* eggs both in the one-cell stage and larval stages. Histopathological changes in the rabbits sensitized with the extract were characterized by a remarkable parenchymal degeneration of liver cells. When the provocative injection of *Ascaris* eggs in the larval stage was made into the portal vein, mononuclear cell nodes were revealed in the livers of the sensitized rabbits. Such nodes, composed of mononuclear cells and a few monohistiocytes, were chiefly seen in the connective tissue (Glisson's capsule). In the livers of unsensitized rabbits in which eggs of *Ascaris* were injected into the portal vein, slight infiltrations of pseudo-eosinophilic leucocytes were seen, but no mononuclear cell nodes. Consequently, these histological changes were similar to those of the tuberculin type reaction caused by the extravascular antigen-antibody reaction.

Y. Yamao

1191—NAKAMURA, F., 1960. [Department of Pathology, Osaka Medical College, Takatsuki, Osaka, Japan.] [Experimental pathological studies on the granuloma by *Ascaris* egg. 2. On the effect of active principles of the Shwartzman phenomenon.] **Japanese Journal of Parasitology, 9** (1), 88–98. [In Japanese: English summary p. 98.]

Nakamura states that histological changes in the liver associated with granulomata due to *Ascaris* eggs are similar to those in a generalized Shwartzman reaction and intravascular antigen-antibody reaction. Embryonated and one-cell stage eggs of pig *Ascaris* were injected into the portal vein of normal rabbits. Culture filtrates of *B. coli* were injected intravenously 24 hours after the first injection. Macroscopic changes observed in the liver of the group injected with the embryonated eggs included multiple haemorrhages, forming numerous petechial spots, and necrosis. Microscopically, wide-spread capillary haemorrhage, venous thrombi and focal necroses were observed in the liver.

Y. Yamao

1192—NAKAMURA, F., 1960. [Department of Pathology, Osaka Medical College, Takatsuki, Osaka, Japan.] [Experimental pathological studies on the granuloma by *Ascaris* egg. 3. On the periodic observations of the granuloma by *Ascaris* egg.] **Japanese Journal of Parasitology, 9** (1), 99–116. [In Japansese: English summary p. 116.]

Rabbits were sensitized with extract of embryonated eggs of pig *Ascaris*. Embryonated eggs and one-cell stage eggs of *Ascaris* were then injected into the portal vein of both the sensitized and non-sensitized rabbits. In the livers of the sensitized rabbits injected with embryonated eggs, mononuclear cell nodes were clearly seen and fibrosis had not developed 10 days after the injection. The nodes became smaller after a month and had further decreased in size after two months; fibrosis was then seen around them. In non-sensitized rabbits injected with one-cell stage eggs the granulomata were seen in the liver ten days after the injection and a considerable degree of fibrosis had occurred; this was still more pronounced after three months. Giant cells and epithelioid cells appeared ten days after the injection and were seen for three months in both the sensitized and non-sensitized rabbits. Cirrhosis of the liver was not produced by a single provocative injection of *Ascaris* eggs. Y. Yamao

1193—POLAK, M. ET AL., 1959. [Faculdade de Medicina, Universidade de São Paulo, Brazil.] "Schistosomiasis mansoni. Pathological changes in the liver in different stages of the disease studied by means of laparoscopy and needle biopsy." **Revista do Instituto de Medicina Tropical de São Paulo, 1** (1), 18–40. [Portuguese summary pp. 39–40.]

30 patients suffering from schistosomiasis mansoni (16 of whom also had ancylostomiasis) were examined by various laboratory and clinical tests, including needle biopsy of the liver and laparoscopy, to determine the changes occurring in the liver and other organs during the course of the disease. Though the cases are divided into four groups, essentially there were only two: (i) those with normal or slightly enlarged liver and normal sized spleen; and (ii) those with enlarged and deformed liver accompanied by splenomegaly. The macroscopic appearances at laparoscopy gave a better idea of the gravity of the liver condition than needle biopsy. The moderately enlarged spleen found in four of the early cases is regarded as due not only to portal hypertension but to a hyperplastic reaction in the spleen. There are some excellent coloured photographs of the laparoscopic appearances. W. K. Dunscombe

1194—SYMONS, L. E. A., 1960. [Division of Animal Health, C.S.I.R.O., McMaster Laboratory, Glebe, N.S.W., Australia.] "Pathology of infestation of the rat with *Nippostrongylus muris* (Yokogawa). II. Chemical constituents of the jejunum and dry weight of the mucosa." **Australian Journal of Biological Sciences, 13** (2), 163–170.

The dry weight of the jejunal mucosa of rats infected with *Nippostrongylus muris* was compared with that of control animals and a 50% increase was found in the infected animals. Comparison of the electrolyte concentration of sodium and chloride showed an increase in jejunal tissue in both wet and fat-free dry weight. Potassium concentration increased on the dry weight but not on the wet tissue basis. Water content was greater in infected rats but the fat content fell. The volume of the whole blood in the jejunum increased twofold in infected animals. It is suggested that these changes may possibly be due to undernourishment.
K. R. Heath

1195—SYMONS, L. E. A., 1960. [Division of Animal Health, C.S.I.R.O., McMaster Laboratory, Glebe, N.S.W., Australia.] "Pathology of infestation of the rat with *Nippostrongylus muris* (Yokogawa). III. Jejunal fluxes *in vivo* of water, sodium, and chloride." **Australian Journal of Biological Sciences, 13** (2), 171–179.

The net fluxes of water, sodium and chloride were measured *in vivo* by the perfusion of the jejunum of albino rats. Comparison of the results obtained with normal rats and rats infected with *Nippostrongylus muris* showed that there is a net absorption of all three substances in normal rats but an influx to the lumen in each case with infected rats. During perfusion with hypo- and hypertonic saline there were unidirectional fluxes of sodium which indicate that this was basically due to derangement of efflux whilst the influx was not affected. The gross effect, however, was also due to an increase of influx because of the greater weight of mucosal tissue per cm. of jejunum of infected animals. K. R. Heath

1196—SYMONS, L. E. A., 1960. [Division of Animal Health, C.S.I.R.O., McMaster Laboratory, Glebe, N.S.W., Australia.] "Pathology of infestation of the rat with *Nippostrongylus muris* (Yokogawa). IV. The absorption of glucose and histidine." **Australian Journal of Biological Sciences, 13** (2), 180–187.

The absorption of l-histidine and d-glucose from the entire small intestine was measured in normal rats and in rats infected with *Nippostrongylus muris*, by the intubation technique. However, absorption of d-glucose from the infected jejunum, when measured *in vivo* by a perfusion technique, was severely reduced. The rate of gastric emptying was not affected by infection. There was a direct relationship between gastric emptying and the rate of absorption of glucose. K. R. Heath

1197—YOKOGAWA, M. & YOSHIMURA, H., 1960. [Department of Parasitology, School of Medicine, Chiba University, Chiba, Japan.] [Histopathological and parasitological examinations of worm cysts which were removed surgically from the lungs of 16 cases of paragonimiasis.] **Japanese Journal of Parasitology, 9** (2), 173–186. [In Japanese: English summary p. 186.]

Cysts which were surgically removed from lungs of 16 cases of paragonimiasis were studied pathologically and parasitologically. Histological changes in the tissues of the lung were similar to those of tuberculosis. Node formation and exudative or productive inflammation were noted, with infiltration of eosinophil leucocytes, plasma cells and large mononuclear histiocytes accompanied by vascular changes. These reactions were considered to be of allergic origin, caused by the parasite. All the flukes obtained were *Paragonimus westermani*. Y. Yamao

Immunity

1198—CROSS, Jr., J. H., 1960. [University of Texas Medical Branch, Galveston, Texas, U.S.A.] "The natural resistance of the white rat to *Nematospiroides dubius* and the effect of cortisone on this resistance." **Journal of Parasitology, 46** (2), 175–185.

The development of *Nematospiroides dubius* is compared in the white mouse and rat. The latter host is naturally resistant to the parasite although in both hosts the larvae penetrate the intestinal mucosa and start development. In the rat an intense inflammatory reaction is produced around the larvae resulting in a connective tissue cyst from which the worms are unable to emerge and re-enter the lumen. The administration of 5 mg. per 100 gm. body-weight of cortisone to the rat was sufficient to inhibit the inflammatory reaction and the parasites underwent a similar cycle to that seen in the mouse. The cortisone treatment was started four days before infection and did not affect the development of the parasite. Treatment with cortisone four to seven days after infection was less effective. K. R. Heath

1199—DAVIES, T. G., 1960. [National Agricultural Advisory Service, Bangor, Wales, U.K.] "A spring oat variety resistant to the stem eelworm." [Correspondence.] **Nature. London, 186** (4727), 813.

Davies records that one oat variety, out of five being used in a trial, showed a high degree of resistance to the stem eelworm *Ditylenchus dipsaci*. This resistant variety is a selection from a cross between 01750/11 and Tama and is being introduced commercially as Manod (S235). D. J. Hooper

1200—FORD, H. W., FEDER, W. A. & HUTCHINS, P. C., 1960. [Citrus Experiment Station, Lake Alfred, Florida, U.S.A.] "Citrus varieties, hybrids, species and relatives evaluated for resistance to the burrowing nematode, *Radopholus similis*." **Plant Disease Reporter, 44** (6), 405.

Ford *et al.* report that between 1956 and 1960, 950 citrus varieties, hybrids, species and relatives have been screened for resistance to *Radopholus similis*. Six kinds have so far been selected as giving satisfactory growth in *R. similis* infested soil in the green-house. They are now being evaluated in infested and non-infested groves. A mimeographed list of the varieties etc. tested may be obtained from the authors. D. J. Hooper

1201—GRZYWIŃSKI, L., 1960. [Zakład Parazytologii i Chorób Inwazyjnych WSR, Wrocław, Poland.] "Próba stosowania odczynu mikroprecypitacji do oznaczania larw nicieni rodzaju *Strongylus*." **Wiadomości Parazytologiczne, 6** (1), 27–29. [English summary p. 29.]

Antigens were prepared from adult *Strongylus equinus*, *S. edentatus* and *S. vulgaris* by extraction in physiological saline. These were then used to prepare the respective antisera in rabbits. Precipitation reactions obtained with such antisera were weak and non-specific, as were also the results of microprecipitation tests using the antisera and first and second-stage living larvae. It is concluded that it is impossible to determine the species of *Strongylus* larvae using these immunological methods. N. Jones

1202—HUIJSMAN, C. A., 1959. "Nature and inheritance of the resistance to the potato root-eelworm, *Heterodera rostochiensis* W. in *Solanum kurtzianum*." **Medelingen Landbouwhogeschool en de Opzoekingsstations van de Staat te Gent, 24** (3/4), 611–613. [Dutch summary p. 613.]

Root diffusate from the resistant wild potato *Solanum kurtzianum* induced larvae of the potato-root eelworm to hatch at about the same rate as *S. andigenum* diffusate. When pots containing *S. kurtzianum* plants were infected with eelworm larvae few cysts developed on the roots. Huijsman concludes, on the basis of these two results, that the nature of resistance is similar in *S. kurtzianum* and *S. indigenum*. It is tentatively suggested that resistance in *S. kurtzianum* is determined by two dominant polymeric genes. H. R. Wallace

1203—JARRETT, W. F. H., JENNINGS, F. W., McINTYRE, W. I. M., MULLIGAN, W., THOMAS, B. A. C. & URQUHART, G. M., 1959. [Glasgow University Veterinary School, Glasgow, Scotland.] "Immunological studies on *Dictyocaulus viviparus* infection. The immunity resulting from experimental infection." **Immunology. Oxford, 2** (3), 252–261.

The authors describe experiments in which they have induced immunity in calves by repeated exposures to *Dictyocaulus viviparus* larvae. In one experiment calves were infected with 2,500 larvae and 160 days later 4,500 and after a further 150 days later with 13,000 larvae. Autopsies were carried out 32 days after the last infection. Following the first infection there was an appreciable number of larvae excreted in the faeces and with the decline in larval excretion a slow build up of complement fixing antibodies occurred. After the second and third infections no larvae were excreted and following each infection there was a sharp rise in complement fixing antibodies. In a second experiment calves were infected with 25 doses of 300 larvae with an interval of two to three days between doses and the period of infection extending over 62 days. 150 days after the last dose of larvae a challenge dose of 15,000 larvae was given to four calves and of 90,000 larvae to another. Calves were killed 30 days after challenge; very few worms were found in the lungs at autopsy. A marked secondary antibody response was noted after the challenging infection. K. R. Heath

1204—JARRETT, W. F. H., JENNINGS, F. W., McINTYRE, W. I. M., MULLIGAN, W. & URQUHART, G. M., 1960. [Glasgow University Veterinary School, Glasgow, Scotland.] "Immunological studies on *Dictyocaulus viviparus* infection. Active immunization with whole worm vaccine." **Immunology. Oxford, 3** (2), 135–144.

Immunizing antigens were produced from freeze dried whole worms which were finely ground in a mortar, transferred to ampoules and sealed under vacuum and stored at 0°C. to 4°C. The final emulsion in Freund's adjuvant contained 1 gm. dried lungworm, 0·625 gm. heat-killed *Mycobacterium phlei*, 50 ml. 0·85% sodium chloride, 50 ml. low viscosity liquid paraffin and 2 gm. "Emocithine" per 100 ml. Comparison was made of the protection and serological and pathological response of groups of calves which had received two 10 ml. doses a month apart administered orally, one dose two months before challenge and one dose one month before challenge and then 4,000 *Dictyocaulus viviparus* larvae administered as a challenge. Unvaccinated calves were used as controls. Autopsies were carried out 30 days after challenge. Only in the group receiving the antigen two months before challenge was any apparent reduction in worm burden found. The group receiving two injections gave a good antibody response but there was no apparent correlation between antibody response and the degree of resistance. The experiment was repeated but the challenge dose was reduced and administered in small repeated doses of larvae. Two doses of antigen were given and a significant reduction was seen when either a simple challenging dose of 2,000 larvae was given or 2,000 larvae administered as 200 larvae per day on alternate days. K. R. Heath

1205—JARRETT, W. F. H., JENNINGS, F. W., McINTYRE, W. I. M., MULLIGAN, W. & URQUHART, G. M., 1960. [Glasgow University Veterinary School, Glasgow, Scotland.] "Immunological studies on *Dictyocaulus viviparus* infection. Immunity produced by the administration of irradiated larvae." **Immunology. Oxford, 3** (2), 145–151.

Groups of calves were immunized by the oral administration of 4,000 larvae of *Dictyocaulus viviparus* which had been exposed to three levels of irradiation, namely, 20,000, 40,000 and 60,000 roentgens. Half the number of calves in each group were challenged by the administration of 4,000 non-irradiated larvae on the 50th day after the immunization. The animals which were not challenged were killed on the 35th day to determine the number of worms in the lungs. In the case of the 20,000 roentgen group this equalled 4·2±3·5; the 40,000 roentgen group figure was 2·0±1·7; and the 60,000 roentgen group nil. Controls were 906·2±373. The challenged animals which were killed 35 days after challenge showed the 20,000 roentgen group to have 15·6±16·7; the 40,000 roentgen group had 13·6±18; and the 60,000 roentgen group had 919±619. The controls had 1,188±375 worms in the lungs. The group which received 4,000 non-irradiated larvae on day 0 and a further 4,000 non-irradiated larvae on day 50 only had 11·4±9. These results together with the examination of lesion scores show that larvae irradiated with 20,000 and 40,000 roentgens gave a very marked degree of immunity but 60,000 roentgens produced over-irradiation and is non-effective. The serum antibody levels rose faster in challenge in the animals receiving larvae irradiated with 20,000 and 40,000r. The respiratory rates after challenge showed the same relationship. Although the first two groups have a small rise in rate during the immunizing period presumably this is attributable to the small number of worms reaching the lungs.

K. R. Heath

1206—KLOETZEL, K., 1959. [Dept. da Parasitologia, Universidade de São Paulo, Brazil.] "A reação de precipitação periovular na esquistossomose. II. Correlação aos dados clínicos." **Revista do Instituto de Medicina Tropical de São Paulo, 1** (2), 129–137. [English summary pp. 136–137.]

The circum-oval precepitation test was carried out first on white mice and then on 173 human beings. Of the latter 55 were without any evidence of infection by *Schistosoma mansoni*; three were recent infections, 38 were included as a test of cure and 80 were untreated persons who were all definitely infected. There was one false positive in the 55 negative persons, and three false negatives in the 80 proved cases [test not done in 23]. The duration of infection does not materially affect the reaction which is roughly quantitative. An index above 10 is evidence of active oviposition even if faecal examination and rectal biopsy are negative.

W. K. Dunscombe

1207—KOYAMA, F., 1959. [Department of Parasitology, Nippon Veterinary and Zootechnical College, Tokyo, Japan.] [Fundamental studies on the immunity of filaria. I. Arthus phenomenon in guinea-pigs sensitized with canine filaria.] **Japanese Journal of Parasitology, 8** (6), 1020–1026. [In Japanese: English summary p. 1026.]

The freeze-dried bodies of *Dirofilaria immitis* were extracted with physiological saline, the extraction rate being 1: 100, and the extract used to sensitize guinea-pigs by subcutaneous, intradermal and intraperitoneal routes and by the adjuvant method of Freund (1942). In all cases, the Arthus phenomenon was observed. Koyama concluded that the adjuvant method was the most desirable one for sensitization.

Y. Yamao

1208—MATOFF, K., 1960. "O przyżyciowej immunobiologicznej diagnostyce trychinellozy." **Wiadomości Parazytologiczne, 6** (1), 11–19. [English summary pp. 18–19.]

Matoff discusses the value of immunological tests in diagnosing trichinelliasis in man and experimentally infected pigs, sheep and rabbits, with particular reference to Roth's, Bachmann's, and Süssenguth & Kline's tests, the complement fixation test and the intradermal test. The microprecipitation (Roth's) and flocculation (Süssenguth & Kline) tests are considered most reliable and the flocculation test is said to be best in diagnosing the infection in pigs. The intradermal test with 1: 10,000 antigen is also useful, but positive results require confirmation by the flocculation or microprecipitation tests.

N. Jones

1209—MULLIGAN, W., 1960. [Division of Animal Health, C.S.I.R.O., McMaster Animal Health Laboratory, Sydney, N.S.W., Australia.] "The use of irradiated larvae as immunising agents against internal parasites." **Australian Veterinary Journal, 36** (4), 176–181.

The author reviews the work carried out on the use of irradiated helminth vaccines against *Dityocaulus viviparus* and *Haemonchus contortus*. Experiments are described by which the most suitable dose of irradiation was selected. For *Dityocaulus* this appears to be 40,000 r. but for *Haemonchus* any dose from 10,000 r. to 60,000 r. It is shown that double vaccination is required to give complete protection to challenge with *Dictyocaulus*. When the immunogenic effect of irradiated *H. contortus* larvae was examined, it was shown that larvae exposed to any level of radiation from 10,000 r. to 60,000 r. gave a better protection than that produced by normal larvae. K. R. Heath

1210—NENOW, S., 1960. "O swoistości próby mikroprecypitacyjnej a żywymi larwami przy włośnicy." **Wiadomości Parazytologiczne, 6** (1), 21–25. [English summary p. 25.]

Nenow has tested the value of the precipitation test according to Roth's (1941) method for the diagnosis of trichinelliasis on sera from 335 healthy persons, from 580 patients suffering from various complaints other than trichinelliasis, and from 262 uninfected pigs. The results, read after two to 20 hours, were positive in 19·4%, 30·0% and 26·7% respectively. In infected persons, however, the reaction was positive in only 55·21%. In the opinion of the author the method is not sufficiently sensitive or specific, but he draws attention to the rather small number of tests made. G. I. Pozniak

1211—REYNOLDS, H. W. & O'BANNON, J. H., 1960. [Agricultural Research Service, Cotton Research Center, Tempe, Arizona, U.S.A.] "Reaction of sixteen varieties of alfalfa to two species of root-knot nematodes." **Plant Disease Reporter, 44** (6), 441–443.

The 16 *Medicago sativa* varieties were grown from seed for 45 days in the green-house in soil infested with either *Meloidogyne javanica* or *M. incognita* var. *acrita*, and estimates made of the degree of infection. The varieties African, Moapa and India were highly resistant to both nematode species; Hairy Peruvian and Sirsa no. 9 were also resistant to *M. incognita* var. *acrita*. All varieties were more heavily infected with *M. javanica* than with *M. incognita* var. *acrita*. M. T. Franklin

1212—STELTER, H., 1959. "Einige Beobachtungen an nicht-knollentragenden Solanaceen in bezug auf den Kartoffelnematoden (*Heterodera rostochiensis* Wr.)." **Nachrichtenblatt für den Deutschen Pflanzenschutzdienst. Berlin, 13** (7), 135.

Stelter tested various non-tuber forming species of *Solanum* for susceptibility to *Heterodera rostochiensis*. Of 23 lines comprising 15 species no cysts were formed on eight. A. M. Shepherd

1213—TAKANO, S., 1960. [Department of Parasitology, School of Medicine, Chiba University, Chiba, Japan.] [Studies on immunological diagnosis of paragonimiasis.] **Japanese Journal of Parasitology, 9** (3), 246–265. [In Japanese: English summary p. 265.]

A survey of paragonimiasis with the intradermal test, complement fixation test (C.F.T.) and the rapid flocculation test (R.F.T.) was made in the endemic areas in Japan. Eggs were found by a stool and sputum examination in 187 cases (25·4%) of 737 positive to the intradermal test, and in 9 cases (3·9%) of 233 negative to the test. Eggs were found in 159 cases (49·1%) out of 386 positive to the C.F.T. and in 37 (6·3%) out of 584 negative for the C.F.T. A strong correlation was seen between the egg positive rate and the antibody titres in C.F.T. The results and sensitivity of the tests were compared. Y. Yamao

Anthelmintics

1214—ABDALLAH, A. & SAIF, M., 1959. [Institute of Research for Tropical Medicine, Cairo.] "The trial of N-(B-oxyethyl)-N-[P-phenoxy (1′-nitro)-benzyl] dichloroacetamide in the treatmen. of ancylostomiasis." **Journal of the Egyptian Medical Association, 42** (10), 574–577.

15 adults suffering from *Ancylostoma duodenale* infections were divided into three groups and treated with various dosage schedules of N-(β-oxyethyl)-N-[*p*-phenoxy (1′-nitro)-benzyl] dichloroacetamide using 250 mg. tablets as the unit dose. No laxative was given. No marked reduction in egg counts was found in any patient. W. K. Dunscombe

1215—AMATO NETO, V., COELHO NETO, A. DA S. & BASSOI, O. N., 1959. [Clínica de Doenças Tropicais e Infectuosas do Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo, Brazil.] "Reação alérgica à piperazina. A propósito de dois casos." **Hospital. Rio de Janeiro, 56** (3), 453–456. [English summary p. 456.]

1216—BAKER, N. F., ALLEN, P. H., LONGHURST, W. M. & DOUGLAS, J. R., 1959. [University of California, School of Veterinary Medicine, Davis, California, U.S.A.] "A comparison of the anthelmintic efficiency of purified and N.F. phenothiazine." **American Journal of Veterinary Research, 20** (75), 409–413.

In experiments with mixed nematode infections in sheep and infections with *Nematospiroides dubius* in mice the anthelmintic efficiency of two purified phenothiazine preparations was compared with that of two grades of National Formulary phenothiazine. The purified phenothiazine used had mean particle sizes of 14·5 μ and 6·6 μ; the N.F. phenothiazine had mean particle sizes of 10·0 μ and 2·6 μ. Estimation of efficiency was based on a comparison of pre-treatment and post-treatment egg counts and recovery of worms at autopsy. Purified 6·6 μ and N.F. 2·6 μ gave comparable results. Purified 14·5 μ was only slightly less effective but N.F. 10·0 μ was markedly inferior. In sheep all preparations were more efficient against species in the abomasum than those in the small intestine. J. E. D. Keeling

1217—BORAY, J. C. & PEARSON, I. G., 1960. [Division of Animal Health, McMaster Animal Health Laboratory, C.S.I.R.O., Sydney, Australia.] "The anthelmintic efficiency of tetrachlorodifluoroethane in sheep infested with *Fasciola hepatica*." **Australian Veterinary Journal, 36** (8), 331–337.

Tetrachlorodifluoroethane or Freon-112 belonging to the group of fluorinated hydrocarbons well known as Freon in the U.S.A. and as Arcton in Britain, was shown to be highly efficient against mature *Fasciola hepatica* in sheep at a dosage of 0·15 gm. per lb. body-weight given as a 50% w/v mixture with liquid paraffin administered with a drench gun. Doses up to ten times (i.e. 1·0 gm. per lb.) the lowest anthelmintic dose rate were non-toxic. After treatment adult flukes became affected with an ascending necrosis and a progressively adverse effect upon development and hatching of eggs was observed. Variable results were obtained against immature parasites. The present cost of treatment is comparable to that of hexachlorethane. A new quantitative diagnostic method for faecal egg counts is described which is a modification of that of Benedek [**Allatorv. Lapok,** 1943, p. 139]; it is claimed to be more sensitive than the potassium mercuri-iodide flotation chamber method of Whitlock (1950). W. M. Fitzsimmons

1218—CHISTIK, T. A., 1957. [Kafedra farmakologii i kafedra biologii i meditsinskoi parazitologii, Kurski gosudarstvenni meditsinski institut, U.S.S.R.] [*Hypericum perforatum* as anthelmintic used in hymenolepiasis and enterobiasis.] **Farmakologiya i Toksikologiya. Moscow, 20** (6), 76–77. [In Russian.]

As observed on 21 puppies, the maximum tolerated dose of liquid extract of *Hypericum perforatum* was 30 ml. per kg. body-weight and the minimum toxic dose was 35 ml. per kg. A 15% infusion of *H. perforatum*, in doses ranging from 100 ml. to 150 ml., and a concentrate, prepared by evaporating to one third of the initial volume, in doses of 2 ml. to 6 ml. cured 41 of 80 children of *Hymenolepis* infection and showed about 70·5% efficacy against enterobiasis in 85 children. N. Jones

1219—DOUGLAS, J. R., BAKER, N. F. & ALLEN, P. H., 1959. [University of California, School of Veterinary Medicine, Davis, California, U.S.A.] "Trial with a new organic phosphate as an anthelmintic in sheep." **American Journal of Veterinary Research, 20** (76), 442–444.

Dowco 105, o-methylo-(4-tert. butyl-2-chlorophenyl) ethylphosphoramidothiate, as a 25% wettable powder given by stomach tube, was effective against nematodes in sheep. At a dose level of 200 mg. per kg. body-weight egg counts were reduced by 89% and at autopsy, worm counts were 93% less than those of the controls. A 75 mg. per kg. dose reduced egg and worm counts by 68% and 55% respectively. The higher dose was effective against *Ostertagia* spp. and *Trichostrongylus vitrinus* in the abomasum, but showed lower activity against *T. axei*. In the small intestine susceptible species included *T. vitrinus*, *T. colubriformis*, *Strongyloides papillosus*, *Nematodirus filicollis* and *N. spathiger*. The drug was well tolerated and the authors considered that compounds of this type show considerable promise as anthelmintics.
J. E. D. Keeling

1220—ENZIE, F. D. & COLGLAZIER, M. L., 1960. [Animal Disease and Parasite Research Division, Agricultural Research Center, USDA, Beltsville, Md, U.S.A.] "Teniacidal trials with some diphenyl sulfones in cats, dogs, and chickens." **American Journal of Veterinary Research, 21** (83), 624–627.

Of several substituted diphenyl sulphones, only bis (2-hydroxy-5-chlorophenyl) sulphone, at dose rates of 400 mg. to 100 mg. per lb. body-weight removed 60% to 100% of 70 *Taenia taeniaeformis* from 13 cats. In dosages of 25 mg. and 30 mg. per lb. 87% to 93% of 209 *T. taeniaeformis* were removed from 37 cats. At 100 mg. per lb. three *T. pisiformis* were removed from two dogs. These constituted the total infection. Emesis and soft faeces were the only signs of toxicity in dogs and cats. This chemical showed no promise against *Raillietina cesticillus* in chickens. Bis (3-chloro-4 hydroxyphenyl) sulphone was completely effective against 17 *T. taeniaeformis* in four cats but ineffective against *T. pisiformis* in dogs at a rate of 100 mg. per lb. At the same rate, bis (3-amino-4 hydroxyphenyl) sulphone, bis (3-nitro-4-chlorophenyl) sulphone, and bis (2-hydroxy-3-chlorophenyl) sulphone showed no promising efficacy in either cats or dogs. G. K. Sweatman

1221—ENZIE, F. D. & COLGLAZIER, M. L., 1960. [Animal Disease and Parasite Research Division, Agricultural Research Service, USDA, Beltsville, Md, U.S.A.] "Preliminary trials with bithionol against tapeworm infections in cats, dogs, sheep, and chickens." **American Journal of Veterinary Research, 21** (83), 628–630.

In three dogs, eight cats and one sheep, all the *Taenia pisiformis*, *T. taeniaeformis* and *Moniezia expansa* respectively were removed by bithionol (2,2′-thiobis-(4,6-dichlorophenol) at a dose rate of 100 mg. per lb. body-weight or greater. Soft faeces and emesis were the only signs of toxicity. Partial removal resulted at lower concentrations in dogs and cats. In chickens, a concentration of 500 mg. per lb. was required to remove all *Raillietina cesticillus*.

G. K. Sweatman

1222—FRIEDHEIM, E. A. H. & DE JONGH, R. T., 1960. "Deux observations d'effets thérapeutiques dans l'onchocercose, après des traitements au Mel W (pentylthiarsaphénylmélamine) et au TWSb (dimercaptosuccinate d'antimoine)." **Bulletin de la Société de Pathologie Exotique, 53** (1), 43–46.

Mel W (pentylthiarsaphenylmelamine) was given intramuscularly to a patient with onchocerciasis. Two courses of treatment were given at an interval of 17 days, and each course consisted of 120 mg. of the drug on the first day and 200 mg. daily for three successive days. For 1½ months the number of microfilariae in the lower half of the body did not change, but a year later it had fallen to zero and nodules had also disappeared. Another patient, with mild onchocerciasis, received two treatments at an interval of 53 days. During the first treatment Mel W was injected intramuscularly at a dose of 150 mg. on the first day followed by three consecutive daily doses of 200 mg. The second treatment consisted of five consecutive daily intramuscular injections of 0·4 gm. of TWSb (antimony dimercaptosuccinate). General improvement began during the fifth month after the beginning of treatment and microfilariae had disappeared within 9½ months. 13 months after the beginning of treatment hyperkeratosis had almost completely disappeared. N. Jones

1223—FUKUI, M., 1960. [Department of Parasitology, Institute for Infectious Diseases, University of Tokyo, Tokyo, Japan.] [Experimental studies on 4-iodothymol as the anthelmintic for canine and human hookworm infections.] **Japanese Journal of Parasitology, 9** (1), 1–22. [In Japanese: English summary p. 21.]

4-iodothymol and piperazine bis iodo-thymolate were found to be the most promising anthelmintics for hookworm infection after screening 200 compounds. The LD_{50} was estimated as 2·6 gm. per kg. body-weight in mice. Dogs tolerated a dose of 2 gm. per kg. after slight signs of intoxication. One cat survived the administration of 2 gm. per kg. but another cat died after receiving 4 gm. per kg. The effectiveness of 4-iodothymol on both canine and human hookworm infections, when compared with that of previously known drugs, such as tetrachlorethylene, shows this compound to be as effective and less toxic. It would obviously be one of the drugs of choice for the treatment of hookworm infections. Y. Yamao

1224—FUJITA, K., 1960. [Department of Parasitology, School of Medicine, Keio University, Tokyo, Japan.] [Studies on the ovicidal effect of agricultural chemicals on *Ascaris* eggs. 2. Effect on the eggs in night soil.] **Japanese Journal of Parasitology, 9** (1), 69–72. [In Japanese: English summary p. 72.]

Swine Ascaris eggs collected from the uterus of the worm were placed in a mixture of human faeces and urine (1 : 4). The chemicals to be tested were suspended in the faeces-urine mixture in a concentration of 1 : 1000. Only cresol and isochlorthion showed an ovicidal effect after 22 days. They also showed an excellent ovicidal effect against human *Ascaris* eggs under the same conditions. Y. Yamao

1225—FUJITA, K., 1960. [Department of Parasitology, School of Medicine, Keio University, Tokyo, Japan.] [Studies on the ovicidal effect of agricultural chemicals on *Ascaris* eggs. 3. Influence of temperatures upon the effectiveness.] **Japanese Journal of Parasitology, 9** (2), 125–128. [In Japanese: English summary p. 128.]

The ovicidal effects of agricultural chemicals at different temperatures (5°C., 17°C. and 33°C.) were compared. Eggs collected from uteri of swine *Ascaris* were immersed in 1 : 1000 solutions of the chemicals to be tested for 7, 12 and 17 days. In general, the lower the temperature, the less effective were the chemicals and vice versa. Isochlorthion, however, was not influenced by change of temperature, which was proved by the uniformly high ovicidal effect. Fujita states that isochlorthion seems to be the ovicide of choice for destroying helminth eggs in nightsoil. Y. Yamao

1226—GALVIN, T. J., BELL, R. R. & TURK, R. D., 1959. [Department of Veterinary Parasitology, Agricultural & Mechanical College of Texas, College Station, Texas, U.S.A.] "The efficacy and toxicity of certain organic phosphates and a carbamide as anthelmintics in ruminants." **American Journal of Veterinary Research, 20** (78), 784–786.

Bayer 21/199, given as a 25% wettable powder in gelatin capsules, was highly effective against *Haemonchus* spp., *Trichostrongylus* spp. and *Cooperia* spp. in seven calves. The dose employed was 25 mg. per kg. body-weight. No signs of toxicity were observed. Out of 14 ewes and five lambs drenched at that dose level all but one ewe died. Bayer 13/59, given as a 50% wettable powder in gelatin capsules, was well tolerated by two calves at a dose level of 100 mg. per kg. but at 220 mg. per kg. one of two calves treated showed signs of drug toxicity. Good clearance of *Haemonchus* spp. was obtained and the compound showed some activity against *Ostertagia* spp. at the higher dose level. No effect was observed on *Cooperia* spp. and other small intestine nematodes. Nicarbazin (4,4-dinitrocarbanilide-2-hydroxy-4,6-dimethyl pyrimidine) given as a drench, was very toxic in two calves at approximately 550 mg. per kg. and had no anthelmintic effect. J. E. D. Keeling

1227—GANGULI, L. K., 1958. [Islamia Hospital, Calcutta.] "Anthelmintic therapy." **Journal of the Indian Medical Association, 31** (10), 400–403.

1228—HAYASHI, E., TAKAMURA, S., SUGIYAMA, K. & SUGIYAMA, T., 1959. [Department of Pharmacology, Shizuoka College of Pharmacy, Shizuoka, Japan.] [Fundamental studies of anthelmintics. 8. Studies on the anthelmintic effect of 4-iodothymol against hookworm.] **Japanese Journal of Parasitology, 8** (6), 909–912. [In Japanese: English summary p. 912.]

The effectiveness of 4-iodothymol (4-iodo-3-methyl-1-hydroxy-6-isopropyl benzene) against hookworm was tested by administration to 77 primary schoolchildren, middle school and high school students. Dosage rates are given and the drug appeared to be quite effective. Y. Yamao

1229—ISAKA, K., 1959. [Department of Surgery, Osaka Red Cross Hospital, Osaka, Japan.] [Experimental studies on canine paragonimiasis. 2. Changes of blood picture and lung of canine paragonimiasis treated with sodium oxiantimonic gluconate.] **Japanese Journal of Parasitology, 8** (6), 992–1004. [In Japanese: English summary p. 1004.]

Experimental paragonimiasis in dogs was treated with sodium antimony gluconate. Haematological and biochemical changes in the blood and pathological changes in the lung were investigated. Three different dosage schedules were employed: 0·01 gm. per kg. body-weight (Sb contained was 0·002835 gm.) for 20 intravenous injections; 0·01 gm. per kg. (Sb 0·0024 gm.)

for 10 intravenous injections; and 0·01 gm. per kg. (Sb 0·0024 gm.) for 20 subcutaneous injections. Isaka states that the sodium antimony gluconate does not eradicate the worms, but is effective enough for the routine clinical treatment of paragonimiasis. Y. Yamao

1230—IWATA, S., OGATA, K. & KISHIGAMI, I., 1960. [Department of Internal Medicine, Osaka Medical College, Takatsuki, Osaka, Japan.] [Anthelmintic studies of domoic acid on Ascaris and whipworm.] **Japanese Journal of Parasitology, 9** (2), 199–201. [In Japanese: English summary p. 201.]

Percentages of *Ascaris* expelled by the administration of 10 mg. and 20 mg. of domoic acid were 72·2% and 75·0% respectively. The percentage of whipworms discharged was 54·5% by 20 mg. of domoic acid given at one time. Side effects observed were headache, abdominal pain, vomiting and diarrhoea. Y. Yamao

1231—JONES, L. M., 1957. "Anthelmintic therapy with piperazine, toluene and cadmium compounds." **Iowa Veterinarian, 28** (1), 28–30, 32–33; (2), 26–30.

1232—KANTOR, S., LEVINE, N. D. & TAYLOR, G. D., 1959. [College of Veterinary Medicine, University of Illinois, Urbana, Illinois, U.S.A.] "Screening tests of carbamates and related compounds against horse strongyle larvae *in vitro*." **American Journal of Veterinary Research, 20** (75), 300–303.

A range of 25 carbamates, four carbamyl derivatives, four carbamides and nine dithiocarbamates were tested for anthelmintic activity *in vitro*. In the test each compound, mixed with talcum powder, was then mixed with nine times its volume of horse faeces containing strongyle eggs and incubated at 20°C. for a week. The larvae were collected in a Baermann apparatus and their numbers compared with those collected from control cultures of pure faeces. Nine carbamate, three carbamyl derivatives and four dithiocarbamates showed activity at a concentration of 0·01M or lower. N-alkylcarbamates appeared more active than phenylcarbamates. J. E. D. Keeling

1233—KOMIYA, Y. ET AL., 1960. [Department of Parasitology, National Institute of Health, Tokyo, Japan.] [The mass treatment of hookworm infection. 4. The comparative study of the anthelmintic effect of 4-iodo-thymol and 1-bromo-naphthol (2) preparation.] **Japanese Journal of Parasitology, 9** (2), 195–198. [In Japanese: English summary p. 198.]

The anthelmintic effect of 4-iodothymol and its side effects were tested, by giving this drug to one group of schoolchildren harbouring hookworms, and 1-bromo-naphthol (2) to another group. The results showed no significant differences between the two drugs, in respect either of anthelmintic effects or toxicity. Komiya *et al.* concluded that the 4-iodothymol preparation could be used for mass treatment of hookworm infection without a laxative. Y. Yamao

1234—KOMIYA, Y., KOJIMA, K., KUMADA, M. & OGAWA, H., 1960. [Department of Parasitology, National Institute of Health, Tokyo, Japan.] [The anthelmintic effect of domoic acid for ascariasis.] **Japanese Journal of Parasitology, 9** (1), 85–87. [In Japanese: English summary p. 87.]

The anthelmintic effect and toxic side effects of domoic acid ($C_{15}H_{21}O_6N.2H_2O$) extracted from the seaweed *Chondria armata* were tested. 10 mg. of the chemical was administered to middle school students having faeces positive for *Ascaris* ova. Among 58 such students 33 became negative. About 9% of those receiving the drug showed slight side effects, such as headache, stomach-ache, nausea and fatigue. Y. Yamao

1235—KOMIYA, Y., SASAKI, T. & IIJIMA, T., 1960. [Department of Parasitology, National Institute of Health, Tokyo, Japan.] [Treatment of schistosomiasis japonica with glucosamine.] **Japanese Journal of Parasitology, 9** (2), 187–189. [In Japanese: English summary p. 189.]

Glucosamine (2-amino-d-glucose) was given to three dogs infected with *Schistosoma japonicum*. Various dosages were tested and 300 gm. was given for 40 days to a patient but the drug was without effect. Y. Yamao

1236—KOZAI, I., 1960. [Department of Parasitology, National Institute of Health, Tokyo, Japan.] [Re-evaluation of sodium nitrite as the ovicide used in nightsoil. 1.] **Japanese Journal of Parasitology, 9** (2), 202–210. [In Japanese: English summary p. 210.]
Kozai attempted to maintain sodium nitrite active in nightsoil by acidifying the medium with calcium superphosphate, $Ca(H_2PO_4)_2$. Hydrochloric and sulphuric acids were compared with calcium superphosphate; in nightsoil acidified with these acids sodium nitrite, in a concentration of 1: 2,000, showed no activity against *Ascaris* eggs exposed to it for three days at 28°C. In the same concentration no larva formation was observed in nightsoil acidified with calcium superphosphate. Y. Yamao

1237—KROTOV, A. I. & BEKHLI, A. F., 1958. [Institut malyarii, meditsinskoi parazitologii i gelmintologii, Ministerstvo zdravookhraneniya SSSR.] [Investigation on new anthelmintics from the phenol series and of their derivatives.] **Farmakologiya i Toksikologiya. Moscow, 21** (3), 49–53. [In Russian.]
Krotov & Bekhli studied the efficacy of a number of compounds against pig ascarids *in vitro*. It was found that: (i) 1: 10,000 concentration of hexylresorcinol showed an effect after one minute and killed the worms after 20 minutes; (ii) no pronounced effect was shown by the derivatives of chromanone and acetophenone tested; (iii) 2-cyclohexyl-4-chlorophenol was found to act on the nervous system of ascarids. Doses of 0·1 gm. to 1·0 gm. of this drug per kg. body-weight, given with calomel, completely cured about 11 of 15 cats and were well tolerated. N. Jones

1238—PARIBOK, V. P., 1957. [Effect of anthelmintics on experimental *Hymenolepis* infection.] **Farmakologiya i Toksikologiya. Moscow, 20** (1), 78–80. [In Russian.]
The four new anthelmintics tested against *Hymenolepis nana* in experimentally infected white mice were, in order of efficiency, Freon-113, Freon-112, the nonene-nonanoic fraction of synthol (synthetic benzine) and benzophenone; they cured respectively 24, 20, 16 and 9 mice out of 30. The doses used equalled 0·2 LD_{50} and were, for the first three compounds respectively, 7·2, 4·7 and 6·4 mg. per gm. body-weight; each was made up with water to 1 ml. Benzophenone was given in doses of 0·8 mg. per gm. (0·4 LD_{50}) in a suspension with gum arabic. The drugs were administered on the 20th to 25th day of infection after a preliminary sugar-water diet and were followed by a laxative; the animals were killed and examined three to five hours later. Three frequently used anthelmintics, male fern extract, carbon tetrachloride and tetrachlorethylene (in doses of 0·17, 0·87 and 0·80 mg. per gm. respectively) were also tested but proved ineffective. G. I. Pozniak

1239—PARIBOK, V. P., 1957. [Comparative studies on the toxicity of anthelmintics to helminths and to host.] **Farmakologiya i Toksikologiya. Moscow, 20** (6), 62–67. [In Russian.]
Paribok has studied the toxicity of hexylresorcinol, thymol, santonin and oxygen in cats and that of carbon tetrachloride and tetrachlorethylene to rabbits, the results being compared with those of studies of the toxicity of these substances to *Toxocara* recovered from cats. It is concluded that: (i) hexylresorcinol, thymol, carbon tetrachloride and tetrachlorethylene have a non-specific action and are more toxic to hosts than to helminths but that this fact is overlooked because these substances are primarily localized in the host intestine, from which their absorption is relatively slow; (ii) oxygen and santonin belong to the group of anthelmintics with a specific action and are more toxic to helminths than to hosts. N. Jones

1240—REINECKE, R. K. & SCHUTTE, J. A., 1959. "Field trials on some anthelmintics for cattle." **Journal of the South African Veterinary Medical Association, 30** (2), 125–134.
The activity of Neguvon and Asuntol was investigated in cattle with ages ranging from three months to over eight years. Drug effect was estimated by comparing pre-treatment and post-treatment faecal egg counts. Species of nematodes were differentiated by identification of infective larvae recovered from faecal cultures. At a dose level of 110 mg. per kg. body-weight, Neguvon caused a reduction of 94·4% in egg counts from *Haemonchus placei*, *Oesophagostomum radiatum* and *Cooperia* spp. Asuntol given at a dose level of 15 mg. per kg. was 100% effective in reducing egg counts of the same species. A range of mixtures in proportions of 10 parts

Neguvon to one part Asuntol were highly effective against *H. placei*, *O. radiatum* and *Trichostrongylus axei*; activity against *Cooperia* spp. was variable and the treatment did not reduce the counts of *Bunostomum phlebotomum* eggs. In toxicity tests cattle which received up to 180 mg. per kg. of Neguvon showed signs of distress but no deaths occurred. 46 cattle which received Asuntol at a dose level of 30 mg. per kg. showed more severe symptoms of toxic effects and one heifer died 12 hours later. Doses of 20 mg. per kg. produced only very mild symptoms in a group of 100 animals. J. E. D. Keeling

1241—RIBEIRO NETTO, A., 1958. [Departamento de Química Orgânica e Biológica, Universidade de São Paulo, Brazil.] "Nota sôbre a inibição, *in vitro*, pela fenotiazina, do desenvolvimento embrionário de *Ascaridia galli* (Schrank 1788)." **Revista da Faculdade de Medicina Veterinária. São Paulo, 6** (2), 181–185. [English summary p. 184.]

Tests were made of the effect of a saturated solution of phenothiazine on the ova of *Ascaridia galli*, the ova being incubated at 28°C. for up to 14 days. The results showed: (i) that the ova were highly sensitive for the first three days; (ii) the sensitivity then decreased rapidly, falling almost to zero after the seventh day; and (iii) contact with the phenothiazine solution for barely 24 hours irreversibly inhibited the development of the embryos.

W. K. Dunscombe

1242—RIEK, R. F., 1958. [Veterinary Parasitology Laboratory, C.S.I.R.O., Yeerongpilly, Queensland, Australia.] "Recent advances in anthelmintics." **Australian Veterinary Journal, 34** (11), 370–375. [Discussion pp. 375–382.]

Riek presents the results of tests carried out in cattle with a number of anthelmintics. Activity was measured by comparison of faecal egg counts made before and after treatment. Toluene, given at a dose level of 10 ml. per 100 lb. body-weight immediately after 60 ml. of 10% sodium bicarbonate, was highly effective against *Haemonchus placei*, *Bunostomum phlebotomum*, *Cooperia pectinata*, *C. punctata*, *Ostertagia ostertagi* and possibly against *Trichostrongylus axei*. No effect was obtained against *Oesophagostomum radiatum*. Best results were seen in animals which had been deprived of food and water overnight. Animals in poor condition showed signs of toxic effects within one hour of dosing but recovered within three to four hours. 1: 8-dihydroxyanthraquinone, administered at a dose level of 2·5 gm. per lb. bodyweight was highly effective against *H. placei*, *C. pectinata*, *C. punctata* and *O. radiatum*. It was probably effective against *Ostertagia ostertagi* but not against *T. axei*, *B. phlebotomum* and immature forms. At that dose level no signs of toxicity were observed but higher doses produced inappetence and severe purgation. The drug was effective when administered directly into the rumen without previous starvation. Piperazine hydrate was highly active against *Oesophagostomum radiatum* at a dose level of 3 gm. per 100 lb. and against *Ostertagia ostertagi* at 5 gm. per 100 lb. but a dose of 30 gm. per 100 lb. did not affect *H. placei*, *T. axei*, *Cooperia* spp. and *B. phlebotomum*. Piperazine-carbodithioic betaine at a dose level of 20 gm. per 100 lb. was highly effective against *H. placei* and *Cooperia* spp. when given directly into the abomasum. Neguvon (Bayer L 13/59) was highly effective against *H. placei* at a dose level of 1 gm. per 100 lb. against *B. phlebotomum*, *C. pectinata*, *C. punctata*, *C. oncophora* and *T. axei* at 5 gm. per 100 lb. It was necessary to ensure that the drug was injected directly into the abomasum to obtain high activity against *Cooperia* spp. The highest dose level was also effective against immature stages of *H. placei*, *Oesophagostomum radiatum*, *B. phlebotomum* and *Cooperia* spp. Cholinesterase activity varied widely between animals and mild symptoms of toxicity were transient. One animal dosed at 10 gm. per 100 lb. died soon after dosing. Asuntol (Bayer 21/199) was highly effective against *H. placei*, *C. pectinata*, *C. punctata* and had variable activity against *Oesophagostomum radiatum* at a dose level of 0·25 gm. per 100 lb. This dose level, the maximum safe dose for cattle, was ineffective against *T. axei* and *B. phlebotomum*. Dow ET-57, at a dose level of 5 gm. per 100 lb. showed a similar range of activity. Phenothiazine was highly efficient against *H. placei* except in the case of the late fourth and early fifth-stage larvae. It is suggested that this drug, given at monthly intervals, can delay the acquisition of resistance in animals fed continuous doses of infective larvae. The author

notes that, under field conditions, phenothiazine has not given satisfactory results in all instances. He concludes that although the margin of safety between high anthelmintic activity and toxicity is very narrow in some of the organo-phosphorous compounds, Neguvon appears to hold promise as an anthelmintic for cattle. Gordon opened the discussion of Riek's paper with a review of anthelmintic tests carried out by many workers. Anthelmintics discussed include Neguvon, Asuntol, Dow ET-57, phenothiazine and its derivatives, piperazine, 1: 8-dihydroxyanthraquinone, toluene, 1: 1′di-n-butyl-2: 2′-carbocyanine iodide, dithiazanine, bephenium hydroxynapthoate, bephenium embonate, n-butyl-N-phenyldithiocarbamate, butyl-N-phenylthioncarbamate, papain, carbon tetrachloride, copper methyl arsenate and Nemadis. J. E. D. Keeling

1243—SATO, K., 1959. [Department of Parasitology, Institute of Infectious Diseases, University of Tokyo, Tokyo, Japan.] [Experimental studies on the chemotherapy of filariasis with the cotton rat filaria *Litomosoides carinii*. I. Effects of diethylcarbamazine (Supatonin) and mapharsol (Mapharsemin) on the microfilariae.] **Japanese Journal of Parasitology, 8** (6), 962–971. [In Japanese: English summary p. 971.]

Studies on the chemotherapy of filariasis were successfully carried out using cotton-rats infected with *Litomosoides carinii* and *Ornithonyssus bacoti* as a transmitter. The effect of diethylcarbamazine (supatonin) and mapharsol (mapharsemin) on the microfilariae in the circulating blood was examined. The toxicity of the two chemicals was tested on laboratory mice. The LD_{50} of diethylcarbamazine was calculated as 485·3 mg. per kg. body-weight and that of mapharsol as 30·9 mg. per kg. when injected intraperitoneally in a single dose. Supatonin, given primarily for five successive days and then at intervals of seven to ten days, lowered the microfilarial count and maintained it at a low level for a considerable time. Mapharsol at 3 mg. to 5 mg. per kg. for 10 days did not affect the microfilarial count within the two-and-a-half month period of observations. Y. Yamao

1244—SATO, K., 1960. [Department of Parasitology, Institute for Infectious Diseases, University of Tokyo, Tokyo, Japan.] [Experimental studies on the chemotherapy of filariasis with the cotton rat filaria *Litomosoides carinii*. 2. Effects of diethylcarbamazine (Supatonin) and mapharsol (Mapharsemin) on the adult worms.] **Japanese Journal of Parasitology, 9** (1), 22–31. [In Japanese: English summary p. 31.]

A series of observations was made on the effects of diethylcarbamazine and mapharsol on the microfilariae of *Litomosoides carinii* in *Sigmodon hispidus* to prove their efficacy against adult worms in different dosage schedules. Large doses (200 mg. per kg. body-weight per day) of diethylcarbamazine (supatonin) administered successively for 10 to 30 days killed only 12% to 20% of adult worms. On the other hand, small doses (20 or 30 mg. per kg. per day) gave higher mortality (33% to 50%) of the adult worms when administered, with long intervals for a longer period (for example, 10 times with 10-day intervals), though the total dosage was much smaller. In the cases treated with daily doses of 50 mg. per kg. of mapharsol for 10 days, a total of 54·2% of adult worms died, although the drug produced no noticeable effect on the microfilarial count. The worms killed by the arsenical were usually entangled with each other, while those killed by diethylcarbamazine were found loose. Y. Yamao

1245—SERIDA, K., 1960. [Faculty of Pharmacy, School of Medicine, Hokkaido University, Sapporo, Japan.] [Studies on the relation between choleretica and santonin in anthelmintic effect on *Ascaris*.] **Japanese Journal of Parasitology, 9** (2), 167–172. [In Japanese: English summary p. 172.]

Serida studied the mechanism of the anthelmintic action of santonin and 2-phenylquinoline-4-carboxylic acid (a choleretic) against *Ascaris lumbricoides* and concluded that decrease in *Ascaris* ova by combined administration of 2-phenylquinoline-4-carboxylic acid and santonin was not due to the choleretic but to the interaction between bile and santonin. Y. Yamao

1246—SHAFEI, A. Z., 1959. [Department of Tropical Medicine, University of Alexandria, U.A.R.] "Clinical trials on a new taeniacidal drug: 2,2′dihydroxy-5,5′dichloro-diphenyl methane." **Journal of the Egyptian Medical Association, 42** (8), 488–492.

Dichlorophen was given to 69 patients, 52 of whom were aged between 16 and 56 years. 39 were infected with *Taenia* and 30 with *Hymenolepis nana*, while 26 had *Ascaris* infection and

two *Ancylostoma* infection as well. The drug was given as tablets, at a dose rate of 0·5 gm. per 7 kg. body-weight divided into three equal daily portions. The effects of fasting and purgatives were tried in 12 individuals. Patients were observed for six months, side effects were slight, and results against *Taenia* and *Hymenolepis* were twice as good as any other anti-cestode drug; against *Ascaris* or *Ancylostoma* there was little effect. For cestodes it is the treatment of choice but associated helminth infections should be treated beforehand; two days of liquid diet before, and a purgative after, treatment raise the cure rate. W. K. Dunscombe

1247—SHANKER, A. & BHARGAVA, R. K., 1960. "Tropical pulmonary eosinophilia." [Correspondence.] **British Medical Journal,** Year 1960, **2** (5193), 234.

Shanker & Bhargava point out, in reply to comments on their work by Sundram that their preliminary trial of parenteral Unicarbazan (diethylcarbamazine) was conducted before a modified form was put on the market and that fresh trials are now being conducted with the new preparation. J. M. Watson

1248—SHARAF, A., HAIBA, M. H. & SHIHATA, I. M., 1959. [Pharmacology Department, Faculty of Veterinary Medicine, National Research Council, Cairo, Egypt.] "An *in vitro* investigation into the anthelmintic properties of a phenothiazine and hexachlorethane compound." **British Veterinary Journal, 115** (12), 444–445.

Whole specimens of *Fasciola gigantica*, anterior portions of *Neoascaris vitulorum*, proglottides of *Dipylidium caninum* and strips of hosts' intestine were placed in Tyrode's solution, containing a mixture of phenothiazine and hexachlorethane at various concentrations. Activity was recorded on a kymograph drum. 10 mg. per kg. of the mixture in a 50 ml. bath stimulated all preparations. The authors consider that these test results provide evidence of the anthelmintic efficiency of the mixture. J. E. D. Keeling

1249—TERHAAR, C. J., HANSEN, M. F., HEIN, R. E. & McFARLAND, R. H., 1959. [Eastman Kodak Co., Rochester, N.Y., U.S.A.] "Anthelmintic studies with carbon 14-labeled carbon tetrachloride on *Ascaridia galli* (Nematoda) and its chicken host." **American Journal of Veterinary Research, 20** (77), 662–664.

When a cockerel was given 1·1 ml. C^{14}-labelled carbon tetrachloride, only 15 minutes elapsed before C^{14}-labelled compounds appeared in the excreta. The caeca had the highest C^{14} content of all the host body tissues and the authors suggest that the drug was absorbed in the duodenum and carried to the caeca in the blood. The fact that unabsorbed markers took at least 3·5 hours to reach the large intestine seemed to support this suggestion. The average uptake of C^{14} by *Ascaridia galli* tissues was much greater than that of any host tissue.
J. E. D. Keeling

1250—UOTANI, K., 1960. [Department of Parasitology, Institute for Infectious Diseases, University of Tokyo, Tokyo, Japan.] [Studies on *Rhabditis* sp. isolated from human urine. 4. The effect of anthelmintics, nematicides and antibiotics on *Rhabditis* sp.] **Japanese Journal of Parasitology, 9** (3), 339–344. [In Japanese: English summary p. 344.]

Among 17 chemicals used as anthelmintics, those effective against hookworms were found to be able to kill *Rhabditis* sp. (Ogu-*Rhabditis*) in relatively low concentrations. Various nematicides, herbicides, plant hormones and antibiotics were also tested. The nematicides were generally quite effective, even in extremely low concentrations. Y. Yamao

1251—WENZEL, D. G. & SMITH, C. M., 1958. [University of Kansas, School of Pharmacy, Lawrence, Kansas, U.S.A.] "A study of the anthelmintic activity of some lactones and peroxides." **Journal of the American Pharmaceutical Association. Scientific Edition, 47** (11), 792–794.

Anterior sections of *Ascaris suum* were used to test the *in vitro* anthelmintic activity of santonin, ouabain, several lactones and peroxides. The mean time to paralysis of the preparation was measured. Tertiary butyl hydroperoxide was the most active compound tested, proving active at a 1: 1000 concentration. No correlation could be obtained between the anthelmintic activity and peroxide forming ability of the lactones. J. E. D. Keeling

1252—WYSOCKI, E. & NASIŁOWSKA, M., 1960. [Laboratorium Technologiczne Dezynfekcji, Dezynsekcji, Deratyzacji, Ministerstwo Zdrowia, Warszawa, Poland.] "Oporność jaj *Ascaris lumbricoides* na działanie środków odkażających z grupy hydroksykwasów aromatycznych." **Wiadomości Parazytologiczne, 6** (2/3), 185–187. [English summary p. 187.]

Wysocki & Nasiłowska tested the antiseptic effect of ten aromatic hydroxy acids of the aryl group against the eggs of *Ascaris lumbricoides* and of *A. suum* in vitro. The acids were used in the form of their sodium salts and in 2% aqueous solutions. Direct contact of the eggs with the solutions for one to ten days, at a temperature of 26°C. had no destructive action on them. The time of development, however, was prolonged by several days with p-chloroanilide of 5-chlorosalicylic acid and with 3,4-dichloroanilide of 5-chlorosalicylic acid. Control experiments using phenol gave satisfactory results. N. Jones

1253—ŽUKOVIĆ, M. & ŠIR, S., 1960. [Department of Parasitology, Veterinary Faculty, University of Zagreb, Yugoslavia.] "Effect of piperazine upon the cholinesterase of ascarides." **Veterinarski Arhiv, 30** (9/10), 263–267. [French & Croatian summaries pp. 266–267.]

Žuković & Šir have studied *in vitro* the effect of piperazine adipate on the cholinesterase of *Ascaris lumbricoides* from pigs. A slightly active cholinesterase was found in the ascarid extract. This enzyme is probably of acetylcholinesterase type and was inhibited by piperazine. The degree of inhibition was in direct relation to the concentration of the drug. The anthelmintic action of piperazine is thus explained as a consequence of its possible influence on the cholinesterase-acetylcholine system. N. Jones

Economic Aspects

1254—BRYDON, P., 1960. [State Abattoir, Homebush, N.S.W., Australia.] "The major causes for condemnation of meat in N.S.W." **Australian Veterinary Journal, 36** (4), 113–117.

The author discusses the main causes for the condemnation of meat in 1959 at the State Abattoir, Homebush, New South Wales and gives some interesting statistics. Condemnations resulting from helminth infections include hydatids (carcasses and livers), and liver-fluke (livers) for cattle; hydatids, sparganosis (carcasses), kidney worm, and *Ascaris lumbricoides* (livers) for pigs; hydatids, *Cysticercus tenuicollis* and liver-fluke (livers) and *C. ovis* (hearts) for sheep. Condemnations for larval cestodes in sheep are described as rather alarming and apparently increasing. The author also refers to condemnation of intestines for sausage casings through infection with *Macracanthorhynchus hirudinaceus* in pigs and *Oesophagostomum columbianum* in sheep. F. H. S. Roberts

1255—FEWSTER, G. E., 1960. [Department of Primary Industry, Melbourne, Victoria, Australia.] "Major causes of condemnation of meat." **Australian Veterinary Journal, 36** (4), 117–121.

In this paper the author discusses the major causes of carcass condemnation for cattle, sheep, lambs and pigs in various parts of Australia. The tables presented include references to *Cysticercus bovis* in cattle and *C. ovis* in lambs. F. H. S. Roberts

1256—GONCHARUK, I. S., 1959. [Appearance and biochemical properties of meat from cattle infected with fascioliasis.] **Sbornik Nauchnikh Trudov. Lvovski Zooveterinarni Institut, 9,** 203–211. [In Russian.]

Goncharuk has studied organoleptic and some biochemical properties of meat from 44 cattle with fascioliasis and 18 non-infected cattle. The results show numerous differences in the quality of meat from healthy and infected cattle. The meat from infected cattle was of a poorer quality, darker in colour, with a different consistency and a greater quantity of volatile fatty acids, etc.; it could be stored for shorter periods than meat from healthy cattle. N. Jones

1257—GONCHARUK, I. S., 1959. [Kafedra tekhnologii produktov zhivotnovodstva i vetsanekspertizi, Lvovski zooveterinarni institut, U.S.S.R.] [Beef output from cattle infected with *Fasciola*.] **Sbornik Nauchnikh Trudov. Lvovski Zooveterinarni Institut, 9,** 213–214. [In Russian.]
Goncharuk has compared meat output in 200 cattle with fascioliasis and 60 healthy cattle. The results are expressed as the percentage of meat to live weight. This percentage was on the average smaller by 3·6% in the case of infected cattle. This difference varied with different degrees of fatness. N. Jones

Evolution

1258—STAMMER, H. J., 1957. [Zoologisches Institut der Universität Erlangen, West Germany.] "Gedanken zu den parasitophyletischen Regeln und zur Evolution der Parasiten." **Zoologischer Anzeiger, 159** (11/12), 255–267.

1259—WRIGHT, C. A., 1960. [Department of Zoology, British Museum (Natural History), London, England.] "Relationships between trematodes and molluscs." **Annals of Tropical Medicine and Parasitology, 54** (1), 1–7.
Wright suggests that speciation in the digenetic trematodes occurs most often as a result of parallel evolution between the flukes and their molluscan intermediate hosts rather than the definitive hosts. He points out the importance of the molluscan population as a centre around which the fluke life-cycle can be completed and which, as a result, serves as a gene pool which, if sufficiently isolated from other such centres, may be the source of evolution of distinct trematode species. The author mentions several ways in which new trematode-mollusc relationships may arise, particularly in the case of those flukes with free-swimming miracidia. C. A. Wright

Nomenclature

1260—CHITWOOD, B. G., 1958. [Laboratory of Comparative Physiology and Morphology, Kaiser Foundation, University of California, Berkeley, California, U.S.A.] "The designation of official names for higher taxa of invertebrates." **Bulletin of Zoological Nomenclature, 15** (25/28), 860–895.
According to the Copenhagen Decisions on Zoological Nomenclature (1953) Official Lists of Phyla, Classes and Orders were to be prepared by Committees of Specialists and passed by vote of the International Commission on Zoological Nomenclature. To assist in the difficult task Chitwood has submitted a summary of the early and more recent history of the higher taxa and has drawn attention to a number of names upon which a ruling should be given. Having failed to find a single formula to justify the adoption of all the currently used higher taxa he suggests acceptance of the name used by the first worker on the group, as now ranked, unless the name is similar to any group excluded from that group. But on democratic grounds he maintains that scientists who disagree with the names adopted by the Commission should be allowed to use in scientific journals those names which they believe to be correct. Although the Copenhagen Colloquium was of opinion that there should be no prescribed terminations for names in the Order/Class Group and Phylum/Group, Chitwood is of opinion that the designation of "Official Uniform Endings for Higher Taxa" by the International Commission would be more successful in stabilizing nomenclature than Official Lists of Phyla, Classes and Orders. In an interesting paragraph attention is drawn to the fact that the Subclass and Class names Phasmidia and Phasmidea proposed by Chitwood & Chitwood in 1933 for a group of nemas are homonyms of the Order and Suborder of insects based on Phasma Lichtenstein 1796 and variously called Phasmida, Phasmatodea, Phasmoidea, Phasmodea. Structures thought to be phasmids have been illustrated in various aphasmidian nemas while in a large number of Tylenchida there are not even rudiments of phasmids. Chitwood now withdraws his names Phasmidia and Aphasmidia and recognizes their synonymy with von

Linstow's (1905) Orders, Secernentes and Adenophori as Classes. The different systems of terminations used by Poche, Pearse, Berg, Stenzel and Hubbs are tabulated and 102 references are appended. R. T. Leiper

Miscellaneous

1261—BARON, R. R., HANSEN, M. F. & LORD, T. H., 1960. [Department of Zoology, Kansas State University, Manhattan, Kansas, U.S.A.] "Bacterial flora of the roundworm *Ascaridia galli* (Schrank) and its relationship to the host flora." **Experimental Parasitology, 9** (3), 281–292.

The authors give a detailed account of methods used and results obtained in a qualitative and quantitative study of bacterial flora of *Ascaridia galli* in relation to intestinal flora of chickens. The cuticle of the worm is sterilized with a 1: 1,000 solution of Roccal by immersion for 10 minutes. This is effective only if the anal and oral apertures are coated with collodion. Ascending paper chromatography methods showed that Roccal did not penetrate the cuticle in sufficient quantity to destroy coelomic and intestinal bacteria during an exposure of 10 minutes. A method for estimating intestinal weights for *A. galli* based on body length and weight of worm is given. In both host and worm anaerobes predominate followed by lactic acid bacteria, aerobes and coliforms in that order. The pseudocoelomic cavity and fluid of *A. galli* are sterile and the eggs do not possess a bacterial flora. Deshelling of *Ascaridia* eggs with Elliot's deshelling solution did not damage the embryo. W. M. Fitzsimmons

1262—EDMONDS, S. J., 1957. "Acanthocephala." **Report Series. B.A.N.Z. Antarctic Research Expedition, 6B** (4), 93–98.

Edmonds annotates six species of acanthocephalans and describes in more detail two, all from the B.A.N.Z. Antarctic Expedition of 1929–31. Those annotated are *Aspersentis austrinus* from *Notothenia* spp. and *Chaenichthys rhinoceratus*, *Echinorhynchus zanclorhynchus* from *Zanclorhynchus spinifer*, *Micracanthocephalus hemiramphi* from *Reporhamphus melanochir*, *Corynosoma clavatum* from *Phalacrocorax* spp., *C. bullosum* from *Mirounga leonina*, and *Bolbosoma brevicolle* from *Balaenopterus musculus*. *Illiosentis furcatus* from *Upenichthys porosus*, and *C. hamanni* from *Leptonychotes weddelli* are described and figured. S. Willmott

***1263**—FILIPP, K., 1957. "Versuche zur Feststellung der Invasionfähigkeit der Muskeltrichine auf Grund des mikroskopischen Verhaltens ihres Zellkörpers im Dunkelfeld." **Dissertation, Munich.**

1264—FREYTAG, K., 1957. "Die Saugleistung medizinischer Blutegel." **Zoologischer Anzeiger, 159** (5/6), 81–85.

1265—MAHON, J., 1960. [Imperial College of Science & Technology, South Kensington, London, S.W.7, U.K.] "Parasites as enemies and allies." [Report of meeting of the Parasitology Group of the Institute of Biology, Liverpool, April 6–8, 1960.] **Nature. London, 187** (4733), 203–204.

The second annual meeting of the Parasitology Group of the Institute of Biology took place in Liverpool during 6th to 8th April, 1960. Among the papers presented were those on: (i) glycogen metabolism of *Haplometra cylindracea*; (ii) the growth of certain tapeworms; (iii) secretions of mucoprotein by the ovejector of *Thelastoma bulhõesi*; (iv) periodic migrations of *Mönnigofilaria setariosa* into the peripheral blood; (v) the development of eggs and larvae of *Nematodirus battus* and *N. filicollis*; and (vi) immunology of *Haemonchus contortus*. N. Jones

1266—NEIFAKH, A. A. & RASS, I. T., 1960. [Institut morfologii zhivotnikh imeni A. N. Severtsova, Akademiya nauk SSSR.] [Study by radiation of the morphogenic activity of nuclei in the embryonic development of *Ascaris suum*.] **Dokladi Akademii Nauk SSSR, 135** (6), 1557–1560. [In Russian.]

Neifakh & Rass having subjected *Ascaris suum* eggs to ionizing radiation at doses which affected the nuclei to the point of inactivation but left the cytoplasm intact, conclude that the morphogenic activity of the nuclei begins from the two-blastomere stage. N. Jones

1267—PANTYUKHOV, A. M., 1960. [Pavlodarskaya oblastnaya sanitarno-epidemiologicheskaya stantsiya, U.S.S.R.] [Some problems in the epidemiology of opisthorchiasis in the Pavlodar region.] **Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow, 29** (3), 347–348. [In Russian.]
Pantyukhov found the incidence of opisthorchiasis in man in the Pavlodar region (middle course of the Irtysh) to be between 3% and 42%. All of 22 cats and 14 of 20 dogs examined were infected. Post-mortem examinations of four *Vulpes vulpes* and five *V. corsac* gave negative results. 1,765 specimens of fish were examined and the incidence of *Opisthorchis felineus* metacercariae was found to be: in *Leuciscus idus* 97·4%, in *L. leuciscus baicalensis* 91% and in *Rutilus rutilus lacustris* 17%. *Tinca tinca* was also infected so that the total incidence of the metacercariae in these four species was 51·7% of 1,408 fish specimens examined. The other fish species examined were *Carassius carassius*, *Perca fluviatilis*, *Esox lucius*, *Lota lota*, *Acerina cernua*, *Acipenser ruthenus* and one specimen of *Stenodus leucichthys nelma*. Metacercariae were most frequently found in the dorsal muscles. N. Jones

1268—WILLIAMS, H. H., 1960. [Department of Zoology, University College, Cardiff, U.K.] "The intestine in members of the genus *Raja* and host-specificity in the Tetraphyllidea." [Correspondence.] **Nature. London, 188** (4749), 514–516.
Differences in the structure of the mucosa of the intestine in some species of the genus *Raja* are described. It is stated that since a correlation occurs between the morphology of the intestine in elasmobranchs and the structure of the scolex of their cestodes this should be considered in studies on the host-specificity of the Tetraphyllidea. H. H. Williams

BOOK REVIEWS

1269—EUZÉBY, J., 1960. [Clinique des Maladies Parasitaires à l'Ecole Vétérinaire de Lyon, France.] "Le parasitisme en pathologie aviaire. Notions de synthèse." **Paris: Vigot Frères,** 106 pp.
In this useful and well illustrated publication Euzéby seeks, not to give an exhaustive account of parasitic infestations of birds, but to draw attention to the chief aspects of parasitic infestations seen in the poultry yards of temperate climates. After giving a definition of parasitism, Euzéby considers the protozoa, helminths, arthropods and fungi which affect poultry, but not the spirochaetes. The longest section of the publication is Part I, which discusses the various syndromes caused directly or indirectly by the parasites, separate chapters being given to affections of the skin and feathers, the head, neck and limbs, the digestive, respiratory and nervous systems, the joints, and to anomalies of egg-laying and incubation of the eggs. Parts II and III discuss more briefly the aetiology and the treatment and prophylaxis respectively of the parasitic infestations. An index and a bibliography complete the work. The 85 illustrations are all good and well reproduced, the photographs of the affected birds and of the lesions caused being especially good, as are also the line drawings of the life-histories. Veterinarians who read French will no doubt find this paper-back edition useful enough to merit a more durable binding. G. Lapage

1270—SPRENT, J. F. A., 1960. "Parasitism. An introduction to parasitology and immunology for students of biology, veterinary science, and medicine." **Brisbane: University of Queensland,** 94 pp. [Mimeographed.]
This book will be interesting and informative to all concerned with parasitology. Sprent discusses with skill parasitism in its conventional sense but introduces the discipline of immunity into his considerations. This he does rightly since in all associations of the parasite with the host, the response of the host cannot be ignored. As well as dealing with the metazoan parasites

conventionally known in helminthology he also introduces for consideration as parasites such things as the foetus, the uterus and the skin graft in experimental animals. His discussion on these shows the relationship of the reaction of the body to these and other infectious organisms. The main part of the book is essentially an introduction to immunology which can be understood by all and in addition he gives a clear account of the relationship of immunity to general parasitism.

He attempts to view the various immunological phenomena on an evolutionary basis moving from necrosis of cells as an example of a primitive response through the phenomena of fixed antibodies such as those in skin sensitization and the tuberculin reaction as an intermediate state in evolution to the present stage of evolution which he quotes as antibody-forming cells producing bivalent antibody. Sprent admits in many of his arguments that they are purely hypothetical, with little evidence one way or the other. However, they do occasion thought and if this were to be the only result of the book it would be of immense value.

This is a book which widens the outlook on parasitology and should make excellent reading for all biologists at any level of training. E. J. L. Soulsby

SUMMARY OF REPORTS

[Only those sections relating to helminthology are abstracted.]

1271—AUSTRALIA. **"The Institute of Medical and Veterinary Science, South Australia. 21st Annual Report, 1958-59."** Adelaide: Government Printer, 100 pp. [Helminths pp. 82–85.] (Received 23.8.60.)

The Veterinary Pathology Division reports (i) for sheep—field trials on the seasonal dynamics of intestinal nematodes in early and late lambs and their treatment with phenothiazine, the initiation of helminth antigen trials, further trials against *Dictyocaulus* with Dictycide with apparent beneficial results, and the study of a lungworm new for Australia believed to be *Protostrongylus rufescens*; and (ii) for cattle—a severe outbreak of *Cooperia* and *Ostertagia* infections which responded to Neguvon, and a number of *Cysticercus bovis* cases the control of which has now been instituted by the authorities. G. I. Pozniak

1272—AUSTRALIA. **"Report of the Commonwealth Scientific and Industrial Research Organization (11th), 1958-59."** Canberra: Commonwealth Government Printer, 181 pp. [Helminths pp. 24, 39, 54-56, 66, 68.] (Received 3.7.60.)

PLANT PATHOLOGY. Work has been done on root-knot nematode resistance in tomatoes and vines, and Nemagon treatment of vines against eelworms. ANIMAL PATHOLOGY. At the Veterinary Parasitology Laboratory, Yeerongpilly, work on gastro-enteritis in cattle comprised egg-counting techniques, the ecology of the parasitic stage on pasture, the temperature effect on the development of parasitic stages, copper in the host-parasite relationship, the pathogenic effects of and the serological response to *Oesophagostomum radiatum*, and on *Fasciola hepatica*. At the McMaster Laboratory, Sydney, and the Regional Pastoral Laboratory, Armidale, a large number of anthelmintics have been tested against sheep helminths; other investigations undertaken on sheep helminths were on the effect of nutrition on *Trichostrongylus colubriformis* infections, on the pathology and epidemiology of intestinal nematodes, resistance and immunity to *Haemonchus contortus*, biochemistry (exsheathment and calcium in gut wall) of *Nippostrongylus muris* and the bionomics of *Simlimnea subaquatilis*. Studies on the association of foot rot with *Strongyloides papillosus* have continued, a survey of helminths from foxes has been made and the value of *Neoaplectana* spp. in the biological control of curl grubs is being investigated. G. I. Pozniak

1273—RHODESIA & NYASALAND. **"Report of the Secretary to the Federal Ministry of Agriculture for the year ended 30th September, 1959."** Salisbury: Government Printer, 212 pp. [Helminths pp. 63, 166, 180, 186, 192.] (Received 19.9.60.)

ANIMAL PATHOLOGY. Continued propaganda against helminthiasis is resulting in a greater awareness by stockowners of the need for control. The average incidence of adult schistosomiasis in cattle at Cold Storage Commission abattoirs was 69·15%. Investigations are continuing on: (i) the life-cycle of *Stilesia hepatica*; four anthelmintics tested against this infection were without effect; (ii) liver-fluke; metacercariae kept in water remained viable for four months but were not infective to sheep at the end of one year; although in Mashonaland infection of cattle is heavy, losses in sheep are not common; and (iii) seasonal variation in helminths in sheep under extensive and intensive grazing with and without anthelmintic dosing. PLANT PATHOLOGY. The experiment on the longevity of *Meloidogyne javanica* showed that all soil types remained infected after 12 months fallow, the infection persisting at a higher level in red and sandy soil than in clayey black soil. An up-to-date host list (425 plant species) of *M. javanica* in the Federation has been published in **Rhod. Agric. J.** and further evidence was obtained that this species is indigenous. Trials have been started on the susceptibility of 100 varieties of legumes, predominantly clovers, to *M. javanica*, others are planned on the susceptibility of kenaf and dhal to *M. javanica* and of various crops to *M. arenaria*.

G. I. Pozniak

REPORTS OF MEETINGS

On 17th April, 1961 Professor R. T. Leiper, C.M.G., D.Sc., M.D., LL.D., F.R.C.P., F.R.S. celebrated his 80th birthday

THIS WAS marked by a reception held at the London School of Hygiene and Tropical Medicine during which tributes were paid to him by Professor Jean G. Baer, Professor T. W. M. Cameron, Dr. E. Hindle, Sir William MacArthur, Professor G. Macdonald, Sir Philip Manson-Bahr, Professor B. G. Peters, Dr. Elsie Toms and Dr. C. Wilcox. Professor Leiper was presented with a "Festschrift" of the *Journal of Helminthology*, which has been published in his honour, and the Bernhard-Nocht Medal of the Hamburg Tropeninstitut.

The ceremony was followed by a sherry party which was attended by members of his family and many colleagues, friends and associates.

S. Willmott

The Spring Meeting of the Institute of Biology Parasitology Group was held at Wills Hall, Bristol from 11th to 13th April, 1961.

Eleven papers of helminthological interest were read, namely, "The early formation of the parasite fauna of fishes" by Dr. Z. Kabata, "Some observations on the biology of *Triaenophorus nodulosus*" by Mr. J. C. Chubb, "Cestodes of the order Tetraphyllidea with a discussion of their host-specificity" by Dr. H. H. Williams, "Studies on the function of the psuedosuckers and holdfast organ of *Diplostomum phoxini* (metacercaria and adult)" by Dr. D. L. Lee, "The systematics and unique development of a gymnophalline trematode, *Panatrema homoeotecnum* n.sp." by Mr. B. L. James, "The effects of temperature on development of eggs of some sheep nematodes" by Dr. H. D. Crofton, "Developmental cycle of *Mecistocirrus digitatus* (Von Linstow, 1908) (class Nematoda, family Trichostrongylidae)" by Mr. S. T. Fernando, "Observations on the immunity of Rhesus monkeys to schistosomiasis" by Dr. S. R. Smithers, "Helminth parasites of wild ruminants in Britain" by Dr. A. M. Dunn, "The course of the life-cycle of *Fasciola hepatica* in Anglesey during 1958" by Dr. C. B. Ollerenshaw, and "Nutritional requirements of *Diplostomum phoxini* (Trematoda) *in vitro*" by Dr. C. A. Hopkins & Mr. M. O. Williams.

Professor Clark P. Read was the invited speaker and gave a most stimulating and thought-provoking paper entitled "The Host-parasite Interface: Molecular Basis of Parasitism".

The Group visited the Bristol Zoo, where members were entertained to sherry, and held a most successful dinner at Wills Hall. Professor T. W. M. Cameron and Dr. C. A. Hopkins made witty and entertaining after-dinner speeches.

S. Willmott

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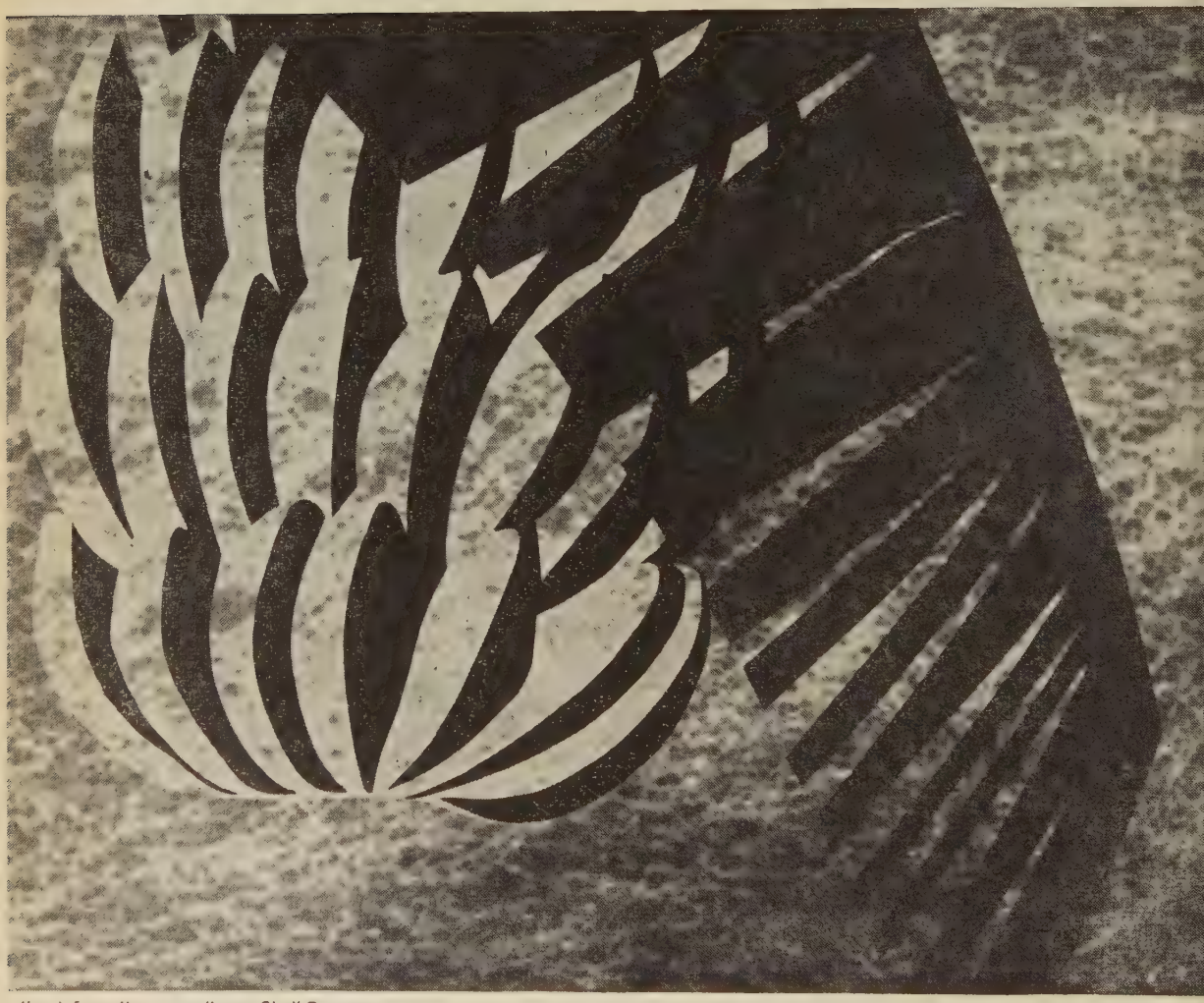
Banana (bănā'nă): f. Port. and Sp.: derived from native name *banana* in Congo. *Musa* species (family *Musaceae*). 1. A plant cultivated in tropical countries; grows to a height of 20 feet. 2. The fruit grow in clusters of finger-like berries, containing highly nutritious pulp. 3. Subject to nematode infestation of the roots causing 'toppling' of the plant, retarded growth and poor yield. 4. Protection against nematodes: Nemagon injected in soil round roots, during or after planting, without risk of damage to the plant. 5. Nemagon is one of the range of Shell pesticides that makes complete crop protection possible (see also aldrin, dieldrin, endrin, Phosdrin and D-D). **Nemagon** *Trade Mark*



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29.	The Cyst-forming Species of *Heterodera*. (1951). Mary T. Franklin. Illustrated cloth	($2.80)	18s. 6d.
30.	The Nematode Parasites of Plants Catalogued Under their Hosts. T. Goodey, J. B. Goodey and Mary T. Franklin. 2nd edition revised (1956)	($4.20)	27s. 6d.
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31.	Plants Recorded as Resistant to Root-Knot Nematodes (*Meloidogyne* spp.) Mary T. Franklin and D. J. Hooper	($1.20)	7s. 6d.
	Ecology of the Free-living Stages of the Nematode Parasites of Sheep in relation to Flock Behaviour and Population Dynamics in Host and Parasite. H. D. Crofton.	In preparation	
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	Pathogenesis of Helminthiasis. G. Lapage.	In preparation	
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